SYNOPSYS®
Accelerating Innovation

Synopsys and Peraso

Peraso Achieves First-Pass Silicon Success for 60 GHz WiGig Baseband SoC With DesignWare IP & Services

"This SoC is our key product, so the IP had to work, and work the first time. DesignWare ARC Processors, USB 3.0 IP, and AMBA Interconnect offered the features that we needed, Synopsys Professional Services helped with integration, and silicon came up in the lab right away."

Brad Lynch
VP Product Development, Peraso

Business

Peraso is a fabless semiconductor company headquartered in Toronto, ON, Canada. The company is focused on the development of 60 GHz chip sets and solutions compliant with the IEEE 802.11ad specification. Peraso is targeting the mobile and wireless markets, and provides products characterized by small footprint, low power consumption and competitive price points.

Challenges

- Obtain a full portfolio of proven IP solutions
- Accelerate software development
- Verify system design before silicon availability
- Bring up new ASIC design flow for the first time
- Address gaps in resource capacity and IP integration expertise

Synopsys Solution

- DesignWare® IP including:
  - USB 3.0 Controller and PHY
  - ARM® AMBA® Interconnect Fabric
  - ARC® 605 Processor
- HAPS® FPGA-based prototyping system
- Virtualizer™ tool set
- Synopsys Professional Services

Benefits

- Achieved first-pass silicon success and accelerated development time by 3 to 6 months
- Reduced integration risk with silicon-proven DesignWare IP
- Received excellent technical support from an expert team that helped set up multiple verification environments to accelerate and ease the integration process

Overview

Peraso's PRS4000 baseband processor provides a cost-effective, low-power, flexible 60 GHz high-speed wireless solution. With USB 3.0 device/host controllers and an integrated PHY, the PRS4000 supports wireless USB 3.0 (WiGig WSE Host and Device) as well as other WiGig MAC functions. Designed for a simple and direct connection to Peraso RF transceiver front-ends, the PRS4000 is ideal for wireless docking, high-speed mobile wireless links, and multi-gigabit wireless Ethernet applications such as small cell backhaul.

Peraso needed first silicon success to establish leadership in the rapidly growing and highly competitive wireless communication market. Facing a new ASIC design flow with many IC integration challenges, including multiple IP cores and third-party

and custom-designed analog front ends, Peraso required a reliable IP and services provider who could cover their resource gaps. Synopsys' DesignWare IP, virtual and hardware-based prototyping solutions, and Synopsys Professional Services offered a complete portfolio of proven solutions, making it possible for Peraso to work with a single, trusted supplier.

High-Quality DesignWare IP

Peraso knew that for their WiGig SoC's success, they needed reliable IP that could be integrated quickly. Peraso evaluated several IP vendors and discovered that Synopsys' ARC Processor had unique features that added significant value to their system. These features included having direct memory access to the tightly coupled memories and extension capabilities through the ARC peripheral bus. "The ARC Processors were ideally suited for our application," said Brad Lynch, VP Product Development, Peraso. "The flexibility of the interfaces and complete configurability let us tailor the processor to our application's requirements."

Due to Synopsys' reputation as a trusted IP vendor, Peraso had confidence that the DesignWare USB 3.0 Controller and PHY IP would work together seamlessly. "Knowing that the controller works with the PHY meant a lot to us. We had to be confident that the IP would function in our design exactly as expected," said Lynch.

Expert and Responsive Services and Support

Peraso engaged with Synopsys Professional Services to help bridge their resource gaps in IP integration. "Synopsys Professional Services did an excellent job all around. They understood our product, leveraged Synopsys' internal expertise, and accelerated parts of our design flow," said Lynch. When further assistance was needed, Synopsys' knowledgeable and responsive technical support worked with Peraso to resolve the challenges they faced.

Prototyping for Fast System Bring-Up

While working with Synopsys Professional Services, Peraso discussed their need for early software development and Synopsys Professional Services demonstrated how Synopsys' Virtualizer virtual prototyping tool and HAPS FPGA-based prototyping system could help. Peraso used Virtualizer to start their software development tasks before RTL availability and seamlessly transitioned to their hardware/software integration tasks and system validation with the HAPS FPGA-based prototyping system. "Including Virtualizer and the HAPS system in the suite of Synopsys products we used on this project easily saved us three to six months in development time," said Lynch.

Future Product Development

Now that Peraso's PRS4000 baseband processor has been successfully deployed, they are deep into product development for their next-generation design. "With our success using Synopsys' IP, tools, and services, it's only natural for us to continue using Synopsys products," said Lynch. In addition to the current Synopsys solutions, Peraso plans to use additional DesignWare IP in their future design.

Figure 1: Peraso PRS4000 baseband processor

"Synopsys offers a 'one stop shop' with a full portfolio of solutions — a complete IP offering, services, and prototyping solutions. Everything works as advertised. All we ask is that when we get the chip back, it works — and by engaging with Synopsys, it did."

Brad Lynch
VP Product Development, Peraso