

# ZYNQ®



## Xilinx and National Instruments

### Product: Zynq SoC-based RIO Platform

National Instruments (NI) standardized on the Zynq® All Programmable SoC as a platform solution back in 2011 and has since launched eight successful derivatives in its RIO (reconfigurable I/O) value line. Each derivative design cost approximately 60 percent less than the first Zynq All Programmable SoC based product, while the company was also able to reduce time-to-market for each derivative by approximately 30 percent - allowing the company to increase profitability.

**“Zynq is a high-value product in that it integrates a processor that gives us about 4x the performance of our previous-generation comparable product.”**

*Chris Rake, Senior R+D Group Manager, NI*

## Executive Summary

### Customer

- National Instruments (NI)

### Challenges

- FPGA + ASSP inefficiency
- Lower cost and power
- Reduce size, cost, and power
- Scalable platform

### Xilinx Solutions

- Monolithic die with ARM+FPGA
- 2-chips to 1-chip
- Reusable IP across derivative products

### Results

- 1 design scaled to 5+ products
- 60% lower cost
- 30% faster TTM

## Challenges

NI had traditionally paired FPGAs with off-the-shelf ASSPs to create the central processing functions for several generations of its RIO embedded control and acquisition line of products. NI needed a single-chip processing platform to vastly streamline its development cycle, expand the RIO product line and increase the company's profitability.

## Xilinx Solutions

NI chose to standardize on the Zynq All Programmable SoC as the processing platform at the heart of its next-generation RIO value controllers. By doing so they could leverage the Zynq AP SoC's pairing of a dual-core ARM® Cortex® A9 MPCore with FPGA logic on one chip and its 3000+ connections between the on-chip processor and logic systems. The efficiency of being able to reuse software across multiple IP over multiple product lines and leveraging the AXI bus for HW IP reuse enabled quick scaling across the product platform. This 2-chip to 1-chip Zynq SoC integration allowed NI to lower BOM costs and reduced form factor. It also enabled NI to eliminate interconnect and additional power circuitry.



The National Instruments  
sbRIO-9651 SOM

## Results

With the Zynq All Programmable SoC, NI created a “master design” for its CRIO-9068 product and then quickly and cost effectively leveraged CRIO-9068’s design IP and lessons learned to create multiple derivative products in quick succession. Chris Rake, Senior R+D Group Manager at NI said, “Zynq allowed us to develop a range of products at the right cost of goods that we needed for the marketplace,” which met all of NI’s design and business objectives. The Zynq SoC-based products NI has launched as part of its platform effort as of August 2014, include:

- **6 CompactRIO Controllers** - high-end software-designed controller (Launched March 2014)
- **myRIO** - Low-cost version targeted at students (Launched August 2013)
- **sbRIO-9651 SOM** - ruggedized embedded development platform (Launched July 2014)
- **roboRIO** - for 2015 First Robotics Competition (Launched August 2014)

Zynq is also leveraged into VirtualBench, a high-end all-in-one instrument (launched June 2014).

With an ASIC/ASSP or two-chip platform, NI’s BOM, design, and time to market goals would not have been met. The company estimates that design cost (cost of engineering) was 60% lower than the cost of their first design, meanwhile time to market for each derivative was lowered by 30% - all of which increases profitability.

## More about NI:

With over 35,000 customers worldwide and revenue of \$1.24B in 2014, National Instruments (Austin, TX) is a producer of test, automatic and control system for scientist, engineers and academics researching and developing life-changing innovations.

“Instead of having two or three separate packages, we now have one package that represents the heart of the architecture and we can dramatically reduce size. Zynq allowed us to develop a range of products at the right cost of goods that we needed for the marketplace.”

*Chris Rake  
Senior R+D Group Manager, NI*



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