CASE STUDY:
SPIRENT COMMUNICATIONS

Kozio kDiagnostics shortens time to market for product to test triple-play applications.

BACKGROUND/OVERVIEW

Spirent Communications (www.spirentcom.com) is a global provider of integrated performance analysis and service assurance solutions that enable the development and deployment of next-generation networking technologies such as broadband services, Internet telephony, 3G wireless and web applications and security testing.

Spirent's solutions are used by more than 1,500 customers in 30 countries, including the world's largest equipment manufacturers, service providers, enterprises and governments. Based in Rockville, Maryland, Spirent Communications reported 2004 revenue of $460 million and has 1,700 employees worldwide.

THE CHALLENGE

Like any company creating a product, time to market is important to Spirent; but as a leading provider of equipment to test emerging networks, the situation is compounded as the company's customers also face serious time-to-market issues delivering the products they create for consumers.

A key product Spirent provides to customers like Fujitsu, Tellabs and Alcatel, which are racing to deploy bundled triple-play services, is its mAXSLAM DSL product for triple-play application testing. "Triple play" refers to the integration of TV/video with voice and broadband access, or simply delivering television, phone and broadband access through a single pipe, typically to a home user.

While working to create the newest revision of mAXSLAM, Spirent faced the difficult task of allocating experienced engineers to handle the task of producing test software to validate the new design's processor-based boards. They needed a way to test the two boards in the product, and develop and deliver board-level diagnostics, board bring-up, power-on self test and manufacturing test capabilities. Additional challenges arose during product development centered on the development and testing of new chip drivers for the processor-boards.

ABOUT SPIRENT'S MAXSLAM

Spirent's mAXSLAM product is a card that includes a main board and a mezzanine board, both using Intel® XScale® processors and other Mips-based processors with GigE switch connectivity. These cards are linked together in a chassis to set up as many ports as necessary – even thousands, if needed for large-scale testing.

mAXSLAM is used to test triple-play networks in the lab and before deployment by generating and analyzing network traffic to ensure quality of service. To do this, mAXSLAM emulates the modem, control and data plane traffic from end-user devices such as VoIP phones, video set-top boxes and computers.

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Ed Ensing,
Manager, Software Development, Spirent

KOZIO'S SOLUTION

Kozio provided kDiagnostics™, kManufacturing™ and kPOST™ to address some of Spirent's product development challenges, with a complete test extension environment so Spirent could add custom test routines and leverage Kozio's software APIs. Kozio also provided on-site training, parallel board testing support and example driver source code.

With Kozio, Spirent was able to make fast progress validating the design, resolving design and software driver issues, and getting the product to market much quicker, while saving real development costs. Just one day after receiving a purchase order, Kozio delivered the first build of a turn-key diagnostics application fully ported to run on the mAXSLAM boards, accelerating bring-up and debug of both boards.

Kozio provided a binary image that Spirent programmed into flash memory, the first software loaded on the boards. kDiagnostics provided a menu-driven environment to test and debug nearly every component on the board, including comprehensive tests for serial, Flash, SDRAM, PCI, Ethernet & Ethernet Switches (MII loopback, PHY loopback, external loopback), Timers, FPGA (loading and specialized tests), LED, I2C, SPI and GPIO interfaces.

kDiagnostics was used to evaluate the following on each of the boards:

- Traffic generation
- Traffic reception
- Traffic generation and reception
- Source/destination MAC addresses
- Variable packet size
- Variable packet contents

Kozio took additional steps to ensure that this project went smoothly. Kozio's Director of Technology, Keith Short, visited Ottawa to train Spirent engineers on using Kozio products and help with kDiagnostics scripting.

"Kozio was very willing to travel and support us, giving us hands-on training and making them more aware of what we were doing, so the relationship was very productive," said Spirent Communications' Manager of Software Development Ed Ensing.

Spirent also provided a mAXSLAM hardware setup that Kozio used to test software enhancements before release to Spirent, enabling Kozio to provide test feedback and suggest solutions to hardware issues they discovered. Engineers at both facilities used kDiagnostics and easily exchanged ASCII test scripts to speed hardware issue resolution.

"Kozio having a mAXSLAM board greatly reduced turnaround time, allowing them to quickly develop solutions and make timely deliveries of tested software updates. They also provided additional test results and proposed resolutions to hardware issues," Ensing reports.

For proprietary portions of the mAXSLAM boards not being tested by kDiagnostics, Spirent created custom C functions to extend the capabilities of Kozio software. Kozio provided a full development environment with Kozio and GNU tools and Kozio header files and libraries that allowed Spirent to re-build the Kozio application images. The final images included their own test code which leveraged Kozio's API and test platform.

Finally, Kozio provided working PCI and Ethernet driver source code, proven reliable on multiple platforms, to help Spirent resolve their own driver issues more quickly.

All this helped significantly to accelerate the product development process.

"Support was outstanding, and Kozio was excellent in making enhancements to their code and offering advice for ours," Ensing notes.

Spirent used kManufacturing™ to validate boards after final assembly, creating a test script to fully validate every assembled board in minutes. The custom script interface also allowed additional configuration files to be loaded from a host computer to serialize boards after they were tested.

Custom test routines developed during early board testing were integrated with no further effort into the test application for manufacturing test and power-on self-test.

When a customer receives a mAXSLAM and powers it on, kPOST™ executes and validates that the processor board is functioning without error. Should an error occur, kDiagnostics is available for complete board validation.

TIMELINE

March 11:
Spirent contacted Kozio early in the product development process, anticipating validation challenges.

April 12:
Spirent receives kDiagnostics evaluation kit for the ADI Engineering Coyote platform.

June 8:
Spirent issues a PO to Kozio and signs Kozio's SLA.

June 9:
Kozio delivers first build of turn-key diagnostics application fully ported to run on mAXSLAM.

July 6:
Under special arrangement, Kozio provided source code for their PCI and Ethernet drivers at no extra cost, allowing Spirent a chance to review working driver code for their own coding benefit.

July 8:
Kozio delivered a complete test code build environment allowing Spirent to add custom test routines taking full advantage of the Kozio software API.

July 13-16:
Keith Short of Kozio flew to Spirent's Ottawa facility during board bring-up to provide product training on the advanced uses of kDiagnostics, custom scripting and building custom test routines.

August 4:
Kozio provides kManufacturing and kPOST releases in a totally integrated build environment allowing Spirent to build all three product images, including their own custom test routines.

October:
Spirent delivers the first working (Beta) system to its lead customer – just 10 months from the start of product development.

August-November:
Kozio provides support and additional software updates to cover minor mAXSLAM board revisions and product enhancements.

"Turnaround time on problems, questions and bug fixes was excellent. Colorado is two time zones away, and we would send information on issues to Kozio before their work day started. They often had a solution to us the same day." Ed Ensing, Manager, Software Development, Spirent Communications.

CONCLUSION

Spirent credits working with Kozio with not only reducing its time to market for the mAXSLAM product, but with also saving the company real development costs. After starting the development of mAXSLAM in December, Spirent was able to deliver a working beta system to its lead customer in just 10 months, with Kozio's assistance.

BENEFITS AND SAVINGS

"Kozio helped us improve our time to market, but they also helped us save real development costs," observes Ed Ensing, Manager, Software Development,
Spirent Communications.

By turning to Kozio for board-level diagnostics, Spirent realized a return on investment of greater than 100 percent.

This savings was realized through a number of key areas, including:

- a significant reduction in the schedule it would have taken to complete this project internally;
- greatly reduced test code development costs;
- reduced board bring-up time;
- reduced driver debug effort;
- reduced manufacturing test development and integration time and effort;
- reduced power-on self-test development and integration time and effort; and reduced time to market.

For more information on Kozio kDiagnostics, please visit www.kozio.com.

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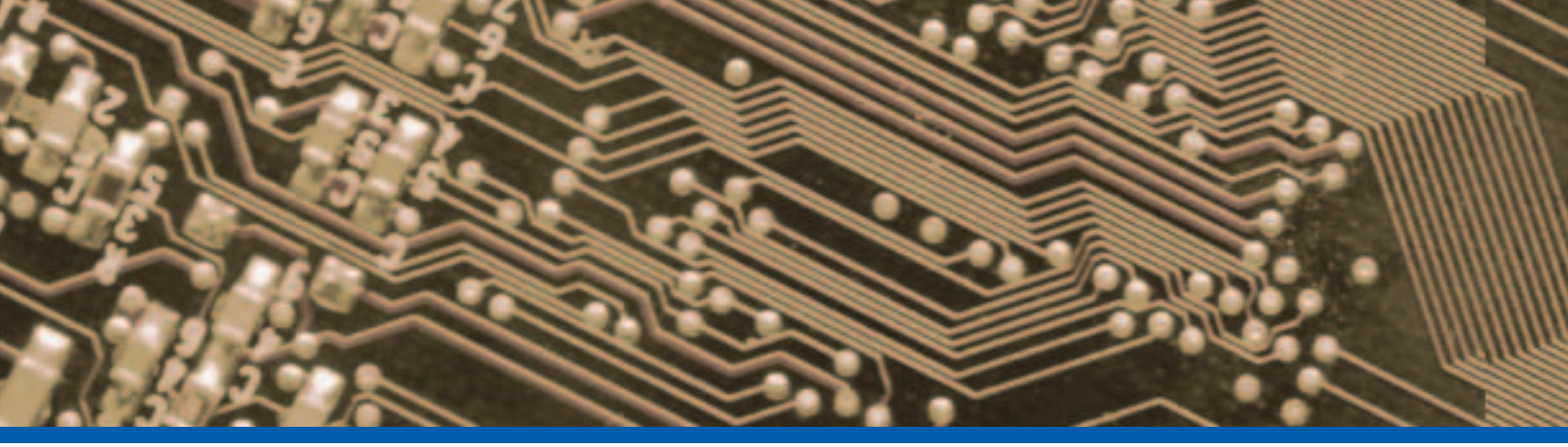

ABOUT KOZIO

Kozio, Inc. is the leader in embedded test solutions for today's electronic products. Kozio delivers turnkey software that provides a comprehensive suite of hardware diagnostics used for debugging and testing custom boards implementing processors from AMCC, ARM, IBM, Intel, Freescale, TI or MIPS. Kozio's clients build state-of-the-art products where successful use of the newest technologies with shortened development cycles requires them to constantly innovate to stay ahead of their competition. Kozio software improves test methodologies and streamlines the development process with proven solutions for board bring-up diagnostics, manufacturing test, environmental test, power-on self-test, in-field diagnostics and returns testing. By delivering thorough software diagnostics ahead of the hardware, Kozio reduces project schedule risk and development costs while increasing test coverage. Headquartered in Longmont, Colorado, Kozio products are available through a direct sales force and worldwide distributors.

For more information, please visit www.kozio.com.

For more information on Spirent, visit www.spirentcom.com.

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Kozio is a general member of the Intel Communications Alliance and works closely with all semi-conductor providers.