S2C
FPGA PROTOTYPING SOLUTIONS

Success Story
SPREADTRUM

Overview

- S2C's rapid SoC prototyping solution reduced the development time, cost and risk for the LTE SoC design.
- S2C's TAI Logic Module played an integral role in Spreadtrum's software application development.
- S2C's prototyping solution enabled immediate availability of a stable and flexible platform instead of building hardware from scratch which would have taken months to complete.

Using S2C rapid SoC prototyping solutions, Spreadtrum was able to optimize its LTE project development process. By system validation and software development on FPGA-based SoC prototyping, the company has not only reduced their design cycle but also improved the flexibility and performance of its mission-critical LTE solutions

Challenge

Spreadtrum aims to develop world leading technologies and products. LTE is the latest standard in mobile network technology. A successful LTE solution is therefore critical.

The ideal solution for LTE must be flexible enough to be deployed in the 4G market for operators around the world. The solution also must be integrated with other wireless interfaces such as 3G, 2G and WiFi. This LTE design must target Spreadtrum's current application and future designs.

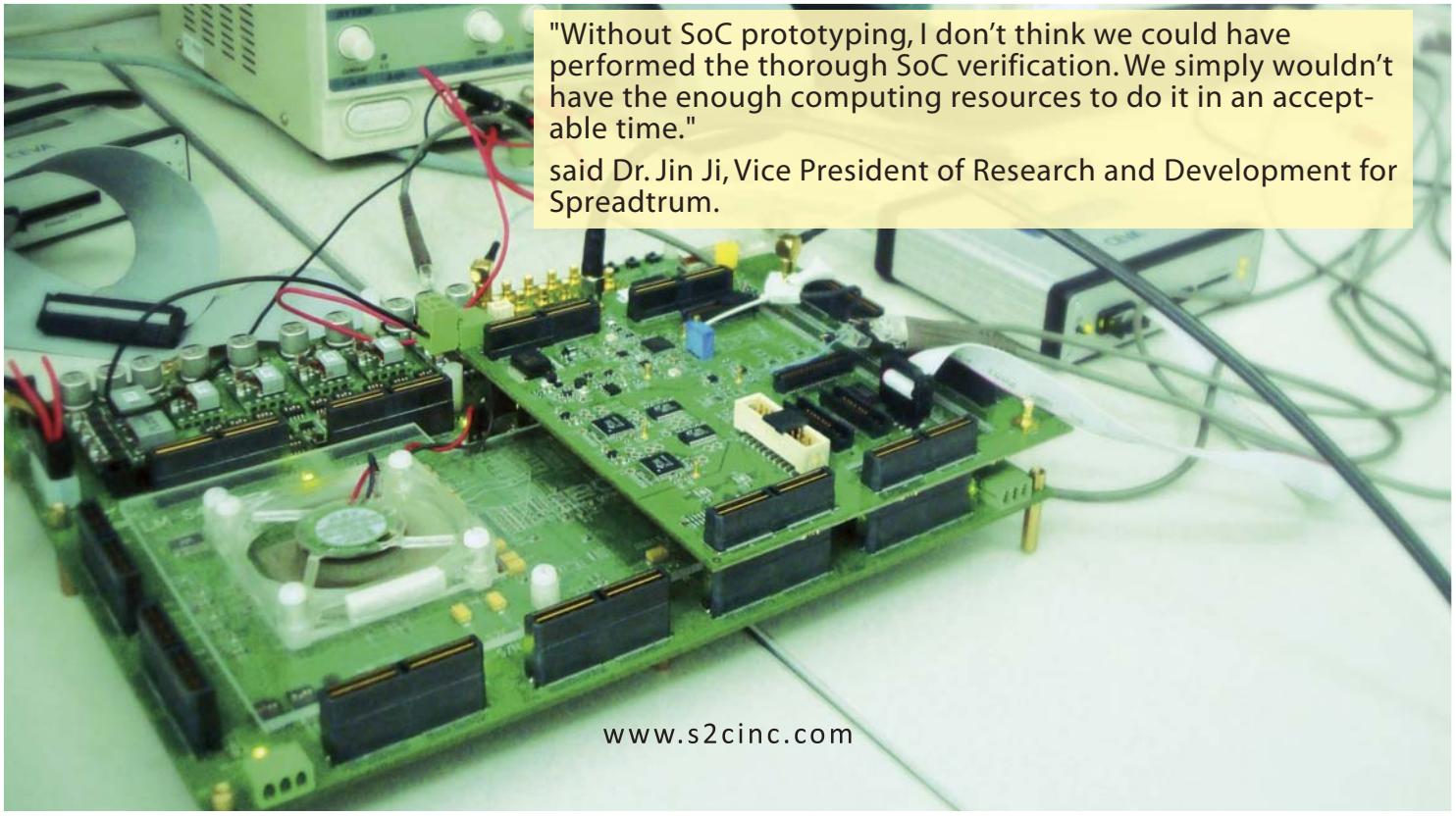
About Spreadtrum

SPREADTRUM®

Spreadtrum Communications, Inc. (Nasdaq: SPRD) is a fabless semiconductor company that develops baseband and RF processor solutions for the wireless communications market. Spreadtrum combines its semiconductor design expertise with its software development capabilities to deliver highly-integrated baseband processors with multi-media functionality and power management.

"Developing a LTE mobile phone SoC is full of challenges such as support for multiple standards while being back-ward compatible and forward expandable," said Dr. Jin Ji, Vice President of Research and Development for Spreadtrum. "We require an extremely flexible and reliable prototyping system for our mission-critical LTE solution, so we can validate multiple requirements in a stable universal platform with various extendable interfaces."

"We had designed FPGA boards for hardware validation by ourselves. It is difficult for us because our expertise is SoC design. Developing the FPGA hardware by ourself added extra months to the SoC design cycle. We needed a ready to work solution that had both high reliability and high performance in order to support our ongoing SoC design." Dr. Ji said.



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Solution

Spreadtrum selected S2C's rapid SoC prototyping solutions based on a review of FPGA-based SoC prototyping products available. "We tried S2C's V4 TAI Logic Module," said Dr. Ji. "We liked the fact that V4 is so reliable and flexible. We can build a working SoC prototype quickly. S2C's customer support also impressed us. We decided to continue to use S2C's V4, V5 and the latest S4 TAI Logic Module to build our LTE SoC prototype. We have 5 boards for the project and we plan to double the boards for our software development."

"Today's cellular network equipment is data-driven and computational complexity grows rapidly, so we integrated DSPs in our LTE SoC processor to communicate with the wireless network." said Dr. Ji. "Its flexibility enables us to develop TD-LTE chips today, to upgrade function using of LTE software without having to develop new silicon chips in the future, especially as the LTE standard continues improve and mature.

Hardware Validation

"More than 6 million ASIC logic gates, including DSP and additional wireless interfaces such as 3G/2G, WiFi, GPS and mobile TV devices, were put into the TAI Logic Module. We designed a daughter card mounted with an existing SoC with peripherals such as DDR2, USB, and SDIO etc. The daughter card connects directly to the TAI Logic Module to build up a full SoC prototyping system."

"A test case running in prototype may need only several hours while a simulation environment may need days and weeks. Bugs can be found early and solved quickly in prototype system. Using the SoC prototype reduced the total verification time and effort." said Dr. Ji. "Without SoC prototyping, I don't think we could have performed such a thorough SoC verification. We simply wouldn't have enough computing resources to do it in an acceptable time. Validation results have already become one of our tape-out sign off checkpoints."

In addition to solving Spreadtrum's challenge of hardware validation, S2C's TAI Logic Module played an integral role in their software applications development. "Featured applications, which improve end-user experience, are the most important way to differentiate competitions. TAI Logic Module solidified our software developing methodology, giving us the approach that we could start software development concurrently with hardware design." said Dr. Ji.

"The DSP design in FPGA runs at 50MHz, which satisfied most applications. The FPGA interfaces run at 100MHz, enabling some of the applications to run at speeds that are close to real silicon. Software can be prepared well before silicon comes back, and porting software to silicon chip is so easy, only need to change clock and power configurations. That gives us edge in the market."

Next, Spreadtrum plans to deploy SoC prototype for its field tests. "Field tests will exposure errors that often cannot be detected in lab environment. It require the prototype system running close to real speed," said Dr. Ji. "Some applications already can run in real time. We will continue to work with S2C to achieve high performance prototyping."

Results

By implementing S2C's rapid SoC prototyping solutions, Spreadtrum can reliably build a LTE SoC prototype in just hours rather than weeks or months.

"Using S2C's rapid SoC prototyping solutions, we can minimize the risk of hardware failure because S2C's pre-engineered products eliminated it" said Dr. Ji. "We can now start prototyping on a stable platform, instead of building new hardware from the beginning, which would have taken several months to complete. The ability to perform concurrent software development saves us even more time." For example, the software engineer can start work and tune applications on the prototype and port it to new chip easily. Without rapid SoC prototyping solutions, it would have taken months to design and debug the prototyping system, and the software development would not start before getting a sample chip

"Ultimately, S2C rapid SoC prototyping solutions has reduced the time, costs and risk associated with LTE SoC design," said Dr. Ji. "By enabling us to effectively co-develop SoC hardware and software, we can get to the market first and beat our competitors."