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DS2 Adopts Synopsys' Confirma™ Rapid Prototyping Solution

HAPS™ Success Story

What Does DS2 Make?

As the saying goes, "power corrupts," but in one Networking Technology in particular, that is simply not acceptable. Broadband-Over-Powerline (BPL) technology uses normally undetectable signals to transmit and receive information over the same wires used to carry electrical mains power. Avoiding signal corruption takes a great deal of ingenuity.

At the leading edge of this technology is DS2 (the name means Design of Systems on Silicon) who create products which help any electrical network to be converted into a high-speed access mechanism. DS2 is based in Valencia, Spain, where they have been one of the pioneers on this BPL technology and now provide ASSP (Application Specific Standard Product) solutions to the major networking OEMs, including Netgear, D-Link, and Buffalo Technology. Service Providers such as British Telecom, Telefonica, and Portugal Telecom also use DS2 technology for distribution of IPTV content using electrical home wiring. In fact, you may already have a DS2 design in your own office or home.

Beyond the office or home, "last mile" access can also be provided by using the electrical cabling that connects every building to its transformer substation; it is even possible to fit medium voltage transformer stations with DS2-based equipment, allowing quick and inexpensive deployment of metropolitan area networks using the medium voltage powerlines (which carry power at 10's of kVolts) as a transmission medium.

How Does DS2 Verify Their Designs?

At the heart of the DS2's ASSP designs lay sophisticated algorithms in hardware and embedded software which encode and retrieve the high-speed transmitted signal into the powerlines. These powerlines can be very noisy electrical environments so a crucial part of the ASSP's development is its verification in a variety of real world environments. As Javier Jimenez, ASIC Design Manager at DS2 explains, "It is necessary to use a robust verification technology in order to develop reliable and high-speed communications. It requires very many real system simulations, trying many channel and noise models. We write our own models in C for early simulation and achieve a relatively fast simulation speed where a second of real-time transmission takes 2300 seconds to simulate."

"Only HAPS gives us the performance and control that we need whilst also being reliable, portable, and of course, flexible enough to protect our investment."

— Javier Jimenez,
ASIC Design Manager,
DS2

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Simply Better Results

As an alternative to creating C models, DS2 could run verifications by directly simulating their Verilog RTL which has to be created anyway in order to implement the design in silicon. However, Verilog RTL simulation would be 40x slower than the C-based simulation. Therefore, DS2 adopted FPGAs as the ideal medium for making the Verilog RTL "simulate" at real-time (i.e. over 2000x faster than the c-based simulation).

"FPGA Prototypes give us the performance that we need to fully test the algorithms," continues Jimenez, "in fact we are also able to run the ASSP's embedded software on the prototype. In addition, we can take the prototypes out of the lab for extensive field testing. We are able to place multiple prototypes in real home and workplace situations, some of them harsh electrical environments indeed. We cannot consider emulator systems for this purpose because they are simply too expensive and non-portable."

The Choice Of FPGA Hardware

In early projects, DS2 engineers designed and built their own FPGA prototype boards in-house using Xilinx's Virtex® 2 FPGAs; in fact three XC2V6000 devices on a board. The project was a success but it tied up two engineers for a year while designing and building the boards to DS2's tough reliability and performance specification.

The next ASSP project is very complex. Faced with the task of developing larger and faster FPGA boards using Virtex 5 FPGAs, DS2 decided that they would rather focus their engineers on core project requirements. They started looking for prototyping boards from an external supplier.

Jimenez continues, "We needed a board solution that would reduce our risks in the project. The boards should be of high quality and have high mechanical reliability. Some of our field trials are performed by engineers from different disciplines so any board failure could not be fixed on the spot. Also, we needed boards to run between 100MHz and 200MHz. We know from our previous experience that it is not easy to make a board which has the matched track-length and routing schemes which allow its use for high-speed designs which may be partitioned across multiple FPGAs."

"We were also looking for boards which could be re-used across many projects. Each ASSP design may have different topography and require intelligent partitioning," stresses Jimenez, "but we should not be constrained by the interconnect resources on the board. We valued a board solution that provided highly flexible interconnect and also has the ability to be adapted to meet the needs of potential future designs."

DS2 reviewed the various offerings from the best known FPGA Prototype platform vendors. As Jimenez recalls, "In some cases, the solution was too complex and we lost control of the FPGA implementation. We are FPGA experts and need to keep control in order to ensure the maximum performance of our designs on the boards."

Conclusion

After intense technical diligence, Jimenez's team invested in the High-performance ASIC Prototyping System™ (HAPS) from Synopsys' Synplicity Business Group. DS2 uses multiple systems based on HAPS-52 boards. Each board has two Virtex 5 FPGAs from Xilinx, specifically the XC5V330-2 devices, and with the combination of connections and peripheral options to meet DS2 exacting needs.

Jimenez concludes, "Only HAPS gives us the performance and control that we need whilst also being reliable, portable, and of course, flexible enough to protect our investment. We look forward to using HAPS on many prototyping projects to come".

To find out more about HAPS, go to www.synplicity.com/products/haps

To find out more about DS2, go to www.ds2.es

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