Did FPGAs kill Structured ASICs?

Ron Wilson - September 26, 2006

Remember Structured ASICs? They were gate arrays reborn: master slices with memory, common peripherals or functions and large arrays of metal-configurable logic pre-diffused, waiting for the last few metal masks to implement the customer’s design in weeks. Real ASICs might be dieing, but Structured ASICs were going to fit perfectly into that big empty space between FPGAs and fully cell-based design, gradually taking up more and more design starts from both alternatives. Many in the press, including this reporter, enthusiastically reported on their rosy future.

But it didn’t work out that way. This year LSI Logic, one of the early proponents, bailed out of the Structured ASIC market while in the process of reinventing itself. Neither NEC nor Fujitsu, both also originally bullish on the devices, are still offering Structured ASICs but no longer emphasize them in their discussions with the press. So is it the Structured ASIC that is dead now?

Nothing would please the FPGA industry more. Structured ASICs occupy the space into which the FPGA business was supposed to grow most rapidly—the mid-range of capacity and performance that defined the practical low end of the ASIC market. Without Structured ASICs buzzing about, the FPGA guys should see their dreams of ASIC conquest coming true. But this scenario hasn’t exactly come about either. FPGAs remain stubbornly impacted in the high-end prototyping/verification market and the low-end logic consolidation area.

So what is going on? One answer is that the SoC market has changed profoundly over the last few years. The number of SoC design starts has declined, perhaps, but the centrality of the cell-based flow, made easier by increasingly effective techniques for finding, evaluating and assembling third-party IP, continues. And as product differentiation has shifted from hardware to software, the availability of ASSPs has for many design teams rendered SoC design unnecessary.

Also, note that a couple of Structured ASIC vendors are doing just fine, thank you. AMI Semiconductor is still doing a strong FPGA conversion business using Structured ASICs as their target. And Faraday Technology is very happy with their results selling Structured ASICs to ASSP developers.

The real answer may be that Structured ASICs are in fact alive and well. In companies that emphasize their cell-based and foundry offerings, the structured devices have served as a selling tool and an important, if little-used, intermediate step in what often ends up being a full-on cell-based design. In much of the ASSP industry structured techniques, whether internally developed or from Structured ASIC vendors, have become central to the design flow. If there is a challenge to the approach, it is from the growing sophistication with which SoC designers are wedding themselves to the third-party IP industry, learning to assemble big silicon-tested blocks into complex chips with short design cycles.