

# The future's bright ...

... the future's programmable logic. **By Graham Pitcher.**

In the 1990s, programmable logic was being touted as the technology of the future. The ability to do with it almost what you wanted was seen as the route to true systems on chips and programmable logic was set to grab a serious chunk of the asic business.

Yet things didn't turn out quite as expected. Is programmable logic a technology whose time has come and gone or is it still a force for change?

One way of measuring a technology's success is the sales figure. A decade ago, programmable logic was a \$4billion market – and it still is today. Why? Krishna Rangasayee, vp of corporate strategic planning for Xilinx, said: "There was a bit of 'crying wolf'. As an industry, we got a bit ahead of ourselves, staking claims to markets served by traditional asic and assp companies before we were ready."

Doug Hunter, Lattice's vp of corporate marketing, added: "Programmable logic devices, particularly fpgas, have only now advanced to the point where they are legitimate design choices for the high volume applications that have been the

sole province of asics and assps. As a result, industry revenues may now grow even faster than predicted." And Hunter pointed to forecasts that sales could reach \$4.6bn in 2011.

It's a theme picked up on by Bob Blake, Altera's European corporate and product marketing manager: "With 28nm fpgas scheduled to ship in 2011, the dynamics of the semiconductor industry are changing. FPGAs have opened a three process gap advantage compared to most asic design starts. The cost, power and performance advantage of this put fpgas in a great position to replace asics and assps in many systems."

There's a perception that programmable logic performance has stalled. Is this so? Answering the question are two new players in the market. First response is from Jack Ogawa, vp of marketing for SiliconBlue. "The overall performance for a given fpga fabric primarily varies with interconnect delays, so the only way to significantly improve performance is to extract efficiencies in interconnect.

"For traditional fpgas, making a performance breakthrough will require interconnect that is tailored for a given type of traffic. For example, interconnect for dsp type applications has different requirements for data throughput from communications applications."

Doug Laird, ceo of Tier Logic, added:

**Rangasayee: "Many [companies] have innovated on different technology bases, [but they have failed] to prove the technology."**



**Hunter: "PLDs have only now advanced to the point where they are legitimate design choices for high volume."**

"If you look at the history of fpgas, the three key factors that vendors concentrated on were density, cost and performance. For years, the focus was almost entirely on density. Once they reached a useful density, it became more about cost. Then it shifted again and customers became bothered by performance. At that time, a typical system clock frequency was less than 50MHz. Today's high end fpgas will run at a clock frequency in excess of 250MHz on complex designs, with smaller system blocks running a lot faster."

Blake noted: "Customer requirements have changed. It is now equally important to manage power as it is performance. Customers want to increase the amount of system integration in the fpga while remaining at fixed power budgets."

Rangasayee conceded: "It's fair to say the industry has transitioned from delivering technology for technology's sake to delivering technologies that address real market and customer driven needs; far beyond simply pushing the envelope on core clock speeds."

Almost without exception, programmable logic is sram or flash based. Why is this? Have other approaches been tried? Ogawa noted: "There are various start ups pursuing



different programmable technologies. However, a stable, volume driven process is one requirement for a sustainable business model and, to date, that has been sram on bulk cmos. Even flash has difficulty.”

Hunter pointed out that sram and flash based technologies have proven to be highly effective. “Certainly other options have been suggested and, in some cases, taken to market. These alternatives have not been successful for a variety of reasons, including the reluctance of customers to adopt design tools that are inadequate, unfamiliar, or both.”

Laird said: “Trying to do something with more exotic technologies always raises questions of manufacturing cost. Although Tier Logic is manufacturing 3d fpgas using TFTs, these are manufactured on a standard cmos volume line and require no additional process equipment.”

Rangasayee added: “More than 50 vendors have tried to provide programmable logic solutions over the past 20 years. Many have innovated on different technology bases, [but they have failed] to prove the technology and/or their business model.”

With companies like Altera and Xilinx ‘hardening’ their latest products, will programmable logic become more assp based? Rangasayee commented: “Programmability has become strategically essential for mid to high volume applications, once the mainstay of asics and assps.”

Blake believed: “The hardening of IP



**Laird:**  
*“Trying to do something with more exotic technologies always raises questions of manufacturing cost.”*

**Blake:** *“FPGAs have opened a three process gap advantage compared to most asic design starts.”*

allows us to free logic resources and offer higher system integration. As a result, we can increase system performance dramatically, while lowering system power and costs.”

Laird believed Altera and Xilinx have not yet taken the steps to integrate the system level IP that would make them more assp like. “This is partly for fear of alienating their customers by competing with them,” he claimed. “The real question is how many electronics system companies will continue to want to differentiate at the hardware level, and therefore do their own logic design.”



And is programmable logic likely to become a communications only technology?

“While communications remains the largest market for fpgas, we see the use of fpgas continue to grow in many segments, most notably the industrial and military markets,” said Blake. “Only if we let it,” Ogawa believed. “Consumer applications in particular present a tremendous opportunity for programmable logic. It has the right

**Ogawa:** *“Programmable logic technology still has a long evolutionary road ahead of it.”*



signature – shrinking new product cycles that are faster than hardware development cycles, fragmented end markets, and enticing volume.”

“We are seeing robust growth in the consumer market,” said Hunter. “CPLDs, because they are non volatile and draw very low power, have become attractive options for handheld consumer products.”

So is it the end of programmable logic as we know it?

“Programmable logic as we know it is alive and well,” Hunter believed. “A persuasive argument can be made that, rather than seeing the end of programmable logic as we know it, we are seeing just the beginning.”

“No,” Rangasayee concluded, “it’s the beginning of a new era. Programmability has become strategically essential for mid to high volume applications, once the mainstay of asics and assps.”

“Programmable logic technology still has a long evolutionary road ahead of it,” Ogawa said. “Consumer applications, in particular, present a tremendous opportunity. It has the right signature – shrinking new product cycles that are faster than hardware development cycles, fragmented end markets, and enticing volume.”

Altera’s Blake, with the last word, said: “Not at all. The inherent benefits that programmable logic provides make it a necessary solution for years to come. That said, we are always looking for ways to remain competitive with assps and asics.”