Welcome to Brainstorm!

When it comes to choosing between FPGAs and ASICs, both technologies have their pros and cons. Ultimately it is the designer's decision as to which one will help get the product to market on time or better yet, before the competition does.

Q: In high-volume consumer electronic devices, which is the best technology to use: FPGA Design Flow or ASIC Design Flow?

By John Burton, Vice President of Marketing for Octera Solutions

The answer of course is 'It depends'. FPGA device density has moved on to the point where it is hard to imagine a consumer electronics device that could not be implemented using the technology. The question then becomes 'does it make commercial sense to implement a product using an FPGA?' The advantages are obvious. FPGAs are available for production as soon as the design is finished and time to market is one of the great drivers of modern product introduction. FPGAs can also easily be changed allowing a product to be adapted to changing consumer sentiment, to add new features or to fix bugs. The disadvantages are also obvious. FPGAs consume more power and cost dramatically more than an equivalent ASIC. A final disadvantage □ that FPGAs are inherently slower than ASICs is probably dying away when the performance of both is so blinding that any imaginable consumer device can be implemented with either.

But let's look at design cycle. A 40 nm FPGA can be bought today and be in production with no NRE mask cost as soon as your engineering team can pump out the required RTL. A 40 nm ASIC will probably take at least a year to reach prototype from the same point and require an expenditure of several million dollars on mask, tooling and prototype costs. And if there's an unforseen bug or feature change, a re-spin cost will be a significant fraction of the original NRE, and several more months before the new part is received.

Faced with these trade-offs, many consumer companies are actually finding other development paths that leverage FPGAs on the path to the final ASIC □ Get the product out fast using an FPGA; migrate that FPGA to a structured ASIC such as Altera's Hardcopy device for medium volume initial production; and replace with the final ASIC a year or more later when it becomes available to achieve the final cost point.

So maybe the answer to the original question isn't 'It depends', but more succinctly 'both'.

By Randall Restle, Technical Marketing Manager, Newark

FPGA devices have made it practical to create products that can deliver an increase in flexibility, through the use of programmable logic providing a low cost and low power solution. The re-programmability of FPGAs enables users to upgrade their products after purchase. More importantly, they often allow developers to create their next generation products or interim design re-spins without the costly and time consuming redesign of circuit boards. FPGAs can also facilitate the spawning of multiple products from a single design platform.

The benefits described are especially good for products that use LCD displays, as it means that any type of LCD interface and input type can be supported by simply modifying the LCD and input controller interfaces that are implemented in the FPGA logic. We also see that the FPGA can do a lot more than just provide a flexible interface for the display and touchscreen; an entire graphics system can be integrated with no need to have any graphics capability in the processor. In fact, it could even run your entire system using processors like Altera's Nios II implemented in the FPGA logic.

The parallel processing capability of the FPGA logic makes it easy to implement video and graphics processing without requiring a heavy duty processor or high clock speed. Special graphics processing features can be implemented into the LCD controller, or a graphics accelerator can deliver a whole range of graphical features. Timing is critical to the operation of a modern digital system.

A variety of techniques and solutions may be used to create a clock source, but whether the required frequency is a few kilohertz or over 100 MHz, designers must consider factors including cost, power consumption, footprint, stability over temperature and supply voltage, and generated noise.

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