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DSPs expand front in consumer media

By Junko Yoshida and Patrick Mannion, EE Times
January 26, 2004 (9:07 AM EST)

New York — Analog Devices Inc.'s rollout today of its latest Blackfin processors reinforces a growing industry consensus that consumer media devices could mark the next great opportunity for digital signal processors.

Math-friendly and readily reprogrammable, DSPs are seen by many as a necessary response to the ever-escalating demands for flexibility and high performance in today's compute-intensive audio and video consumer applications.

Newly architected chips like Blackfin, some authorities suggest, provide a compact way to save space and power over traditional solutions that team a DSP with a microcontroller in a configuration that one observer dismisses as "just the DSP chip next to some other chip."

Traditionally, consumer systems have used a combination of DSPs for compute-intensive video and graphics processing, and a RISC-based processor for user-interface and control functions. Texas Instruments Inc., for example, couples a C55x or C64x DSP with an ARM. In the case of Blackfin, ADI is counting on the processor's blend of high-end, code-efficient DSP processing with impressive RISC performance to obviate a dual-processor DSP/ARM approach in all but the most demanding applications.

While the Blackfins also target automotive and industrial applications and mobile handsets, the company is clearly emphasizing consumer media. As John Croteau, general manager of ADI's media platforms and services group, said, "We see the end game [for Blackfin] in digital entertainment."

Many in the industry seem to support the direction taken by ADI (Norwood, Mass.).

Jeff Bier, general manager of independent research firm Berkeley Design Technology Inc. (Berkeley, Calif.), said today's extensive new product development — video on handsets, portable video jukeboxes, Internet Protocol set-top boxes, DVRs and HDTV — requires the flexibility DSPs provide. "There's huge flux in algorithms and standards and the consensus in features just isn't there," he said. "You can't do it in hardware as you need the programmability — with good performance — to meet the needs of the applications."

Will Strauss, president of market research firm Forward Concepts (Tempe, Ariz.), said in a recent report that the electronics industry is making a fundamental shift, "moving from the personal computer era to a new era driven by connectivity and multimedia." DSPs, he said, will be at the heart of that migration.

Clearly, programmability is becoming the holy grail. With more devices being networked, they need to be interoperable. Sometimes, simple competition points to programmable solutions. In Japan, for example, consumer electronics manufacturers are under heavy pressure to differentiate their products from far less expensive offerings coming out of China, ADI's Croteau said.

As Jim Turley, a microprocessor analyst and editor of Silicon-Insider, summed it up: "The 'ASIC boom' of the late 1990s is over — for good — in my opinion. It's simply too expensive and too time-consuming to develop your own chip, even if you do have the talent and the budget. Processors, DSPs, controllers, and even FPGAs offer a more attractive alternative in many cases."

The degree to which ADI meets, as Bier put it, "the needs of the applications" will determine how well it fares against digital entertainment and multimedia incumbents like Texas Instruments Inc. TI can counter with its entrenched DM64x, which is based on the company's high-end C64x line, and the C55x DSP lineup for portable and client devices.

But, Turley said, "ADI does pretty well here, holding its own against the 500-pound gorilla — TI — in consumer electronics." He said much of the attraction is Blackfin's "microcontroller-like features, which make the chips suitable as the only chip in a product, rather than just the DSP chip next to some other chip [such as an ARM microcontroller]."

Jerry McGuire, an ADI general manager in the media products and services group, cited additional advantages embedded within Blackfin. "From the start, we enhanced video performance with a special instruction set," he said. "Also, for data movement, we have sophisticated DMA [direct memory access] including 2-D DMA — which drives video performance."

But Rod Trautman, TI's general manager of worldwide catalog DSP and end equipment, contrasted ADI's relatively brief experience with supporting consumer multimedia applications to TI's years of success in fulfilling third-party tasks for the C55. Analyst Bier agreed, noting how swiftly the bar for software and development support is rising as applications become more complex. Still, he said, "ADI is off to a good start and I think the support system is building around Blackfin. But it takes years and will require significant sustained investment."

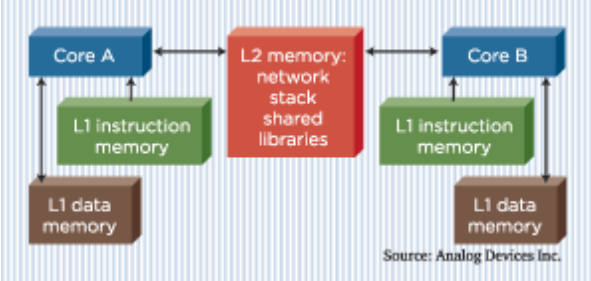
ADI is fast gathering momentum in its new territory. Blackfin DSPs are already designed into a host of emerging consumer products, including Microsoft Corp.'s Windows Media Center Extender, Roku's Network Music Player and embedded lock systems running AuthenTec's fingerprint sensor technology.

A/V's pulse

In many embedded consumer systems, Blackfin is at the heart of audio and video decoding while also functioning as a processor controlling a system. Blackfin can decode a variety of digital media formats including MP3, Windows Media Audio 9, WAV, AIFF and AAC files, MPEG-2, MPEG-4 and Windows Media Video 9.

A few competing DSP or media processor companies have ostensibly beaten ADI by being the first to decode advanced video-compression formats like Windows Media 9 Video in software. "But we are the first to enable it at the capacity, price level and power consumption consumer OEMs want in their volume shippable consumer products," said Scot Robertson, ADI's director of marketing for Blackfin eMedia Platforms.

ADI lists eight new members of the Blackfin Processor line in its 2004 road map, differentiating them through peripherals that range from integrated 10/100 Ethernet MAC, PCI or USB2.0 On-the-Go to LCD controllers.



Identifying the right peripherals for integration on each of those products could be critical to ADI's success in the consumer IC market. Said Turley: "CE customers are fanatical about not paying for features they don't need or don't use. If a chip has significantly more features than the customer needs, it's a nonstarter. . . . There's a delicate balancing act between providing too much and too little integration."

For all of ADI's consumer product thrust, Forward Concepts' Strauss believes it may take "a couple of years to wean most of ADI's fixed-point customer base from the old to the newer and more attractive platform."

"ADI's principal problem is that Blackfin is not code-compatible with its earlier ADSP-21XX fixed-point families," he said.

But Bier disagreed. "It's now clear that ADI is making a commitment to Blackfin," he said. "They're now focusing on the Tigersharc, the Sharc and the Blackfin — the fixed-point 218x [and] 219x are being pushed to the background. They've removed the uncertainty over which architecture would go."

ADI's Croteau confirmed the shift in focus. "We will continue to support 218 and 219x, but the apps are gravitating to the Blackfin."