



# Meeting the Demand for Higher-performance DSPs

By Ray Simar

In today's fiercely competitive marketplace, there is a strong need for faster chips to drive new applications and more powerful functionality. The stream of new end products and equipment that execute real-time signal processing is expanding. In their display of new features, functionality and adherence to new standards, this equipment illustrates an urgent demand for continually higher-performing DSPs and software. Signal processing developers require greater performance for their applications, many of which are increasingly complex. Cellular phones now perform more functions than ever before. Not only are voice, video, security encryption, etc. available on cell phones, but they must perform simultaneously. Developers also need higher performance DSPs for more channels so that base stations, for example, can handle more subscribers.

New capabilities such as DSL modems are enabled by high-performing DSPs. At home and central office sites, DSL modems require more powerful DSPs to perform their functions and service multiple channels. New standards such as VDSL demand even higher performance.

Of course there are additional challenges of cost, flexibility and getting to market faster. DSPs rather than ASICs increase product flexibility since they allow new functions to be added later. Once the product is deployed, it can be upgraded in the field with software program downloads. It is easier and more economical to make changes to DSP-based products while ASIC-based products must be completely redesigned.

Developers need not only high performance DSPs to overcome these chal-

lenges, they need the software and development tools to advance their applications. Because DSPs are programmable processors, simulation and emulation capabilities are indispensable for writing, testing and debugging applications.

Higher DSP clock rates such 720 MHz and 1 GHz - TI recently introduced the world's first 720 MHz and plans for the only GHz DSPs - pave the way for increases in channel density, higher frame rates and faster compression and decompression. This increased performance drives further improvement and innovation in real-time applications, in particular, in wireless and telecommunications infrastructures, digital video and digital imaging. Transcoders in wireless cell phone infrastructures, for example, convert voice signals compressed in landline phone format to signals compressed in a wireless transmission format - and back again. These conversions require the larger amount of computing ability that higher-performance DSPs offer.

Users also push the infrastructure for more performance. The greater capabilities of the newest cell phones for sending and receiving messages and photos mean that more data must be sent or received by the phone. These capabilities increase the pressure on infrastructures to deliver ever faster service, requiring continual upgrades to avoid user complaints.

In telecommunications infrastructures, an ADSL central office, for example, needs more power to process multiple incoming and outgoing ADSL connections. In digital video, video transcoders convert to and from different video formats, and digital imaging is increasing in importance for its growing

use in security systems and state of the art manufacturing inspection lines.

Some benefits that application designers reap from higher-performance DSPs, software and development systems include:

- Increased channel density - more channels per card - to facilitate handling more subscribers
- Software compatibility for a better upgrade path, leveraging the code developed on one DSP for more efficient migration to new DSP platforms
- Higher quality video from higher frame rates for faster updating of pixels for better resolution
- Better quality audio at higher compression rates
- Less need for memory storage because of more highly compressed media

Higher-performance DSPs have also created important new capabilities in products. An improved DSP-based ultrasound product now enables the diagnosis of health problems that could not be diagnosed before. Elsewhere, signal transmission is greatly improved by adaptive antenna arrays that can now tune themselves.

The message is clear. The market urgently demands more power, features and functionality from end products and equipment. To compete successfully in this market, developers must use higher-performance DSPs, software and development tools.



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