

## **CAST JPEG 2000 Encoder Core Provides Fast, Flexible Image Compression**

*Hardware acceleration for advanced standard enables new applications; comprehensive, programmable core simplifies system development*

**June 10, 2002 (Design Automation Conference) New Orleans, Louisiana** — Semiconductor intellectual property (IP) provider CAST, Inc. today announced a new addition to its line of general purpose IP (gpIP) for electronic design: the JPEG2K\_E JPEG 2000 Encoder Core.

Providing complete hardware acceleration of the JPEG 2000 standard, the new core processes images or video at competitive rates of 10 Megasamples per second for lossless compression and up to 40 Megasamples per second for lossy compression (in a 100 MHz FPGA). This enables lossless encoding of a 5 megapixel camera image in half a second, or of standard definition TV (720 x 480 pixels) at 30 frames per second.

The core is also quite flexible, with implementation options and programmability features that make it easy to tailor to specific devices, applications, and systems. Designers can trade off image quality options against processing speed, for example, or control factors to achieve an especially small or low-power design.

“JPEG 2000 is a huge improvement that’s sure to spawn exciting new applications and products,” said Hal Barbour, president of CAST. “Our new encoder makes this sophisticated technology more accessible, letting conventional designers build advanced compression into mainstream products while offering power and features even experts in graphics hardware appreciate.”

The royalty-free JPEG2K\_E core is available now for synthesis to ASICs or optimized for programmable devices from Altera and Xilinx. JPEG 2000 decoder and CODEC cores will follow later this year. Various subsystem functions are also available now, including several Discrete Wavelet Transform, Discrete Cosine Transform, and Huffman Encoder cores. Designers should check the CAST web site for details ([www.cast-inc.com](http://www.cast-inc.com)).

## Designed for Emerging Applications

Compared with today's popular JPEG standard, the ISO/IEC 15444-1 JPEG 2000 Image Coding System standard provides more efficient compression, better image quality, and greatly improved error resilience and transmission noise tolerance (see [www.jpeg.org](http://www.jpeg.org)).

The JPEG2K\_E core's 100% support for this standard makes it a good choice for many state-of-the-art image processing applications. These range from mobile telephones where fast transmission speed is critical, to medical instrumentation where lossless image quality is most important. Other applications include digital still cameras, video conferencing or surveillance systems, wireless PDAs, and satellite image processors. New types of products are also likely, such as prepress tools and digital photo library systems that take advantage of the JPEG2K\_E's scalable lossy/lossless compression capabilities.

The new JPEG2K\_E core is designed to help developers reach the market quicker with more competitive versions of these advanced new products. It easily integrates with a system's host processor, and fully offloads compression responsibilities from the processor to free it for other duties.

Pre-synthesis choices such as the DWT filter type, number of entropy coding units, and maximum image size help designers tailor the core's capabilities to fit in crowded SoCs or small FPGAs. A variety of programmable features — including the number of wavelet transform levels, the code block size, and variable quantization tables — help designers reach the optimum balance between image quality, processing time, and power consumption for their specific systems.

## Robust Technical Features

A good implementation of the underlying Discrete Wavelet Transform (DWT) algorithm is critical to effective image compression. The JPEG2K\_E core offers both 5/3 and 9/7 wavelet filters, enabling the best quality and greatest efficiency for both lossless and lossy compression. Efficient memory management and options for DWT filter type, data path accuracy, and other factors help reduce the core's processing time and memory requirements.

Images are typically broken into tiles for processing. The JPEG2K\_E handles complex, natural images well by supporting a relatively large maximum tile size (256 x 256 pixels) and maximum pixel depth (14).

The core's input images may originate in any color space (RGB, YCrCb, YUV, CMYK, etc.) because it includes programmable sample accuracy and other functions required to handle this. For greater design flexibility, the inputs may feed to the core through the host processor interface or directly through the core's separate pixel interface.

The design of the core is fully synchronous, and it can be targeted to ASIC or FPGA implementation. Internal memory requirements for the core are modest, ranging from 43 KB for a standard version to 80 KB for maximum performance.

The JPEG2K\_E core was developed by CAST partner Alma Technologies S.A. ([www.alma-tech.com](http://www.alma-tech.com)). Based in Greece and staffed by published PhDs and award winning designers, Alma applies their considerable expertise in digital signal processing and VLSI design to building rigorous intellectual property and providing high-end design services.

## **About CAST, Inc.**

CAST provides general purpose IP (gpIP), a broad range of popular and standards-based cores that includes processors, interfaces, and application-specific functions for multimedia and encryption. Designers use these cores so they can concentrate on the more unique, creative aspects of their system designs, or to quickly incorporate technology beyond their normal expertise.

Privately owned and operating since 1993 with a focus on making IP practical and affordable, the company has established a reputation for high-quality products, simple licensing, and responsive technical support. CAST is located near New York City, and works with an international network of IP developers and distributors.

CAST, Inc.  
11 Stonewall Court, Woodcliff Lake, NJ 07677 USA  
Tel: 201/391-8300 info@cast-inc.com  
Fax: 201/391-8694 www.cast-inc.com

###