

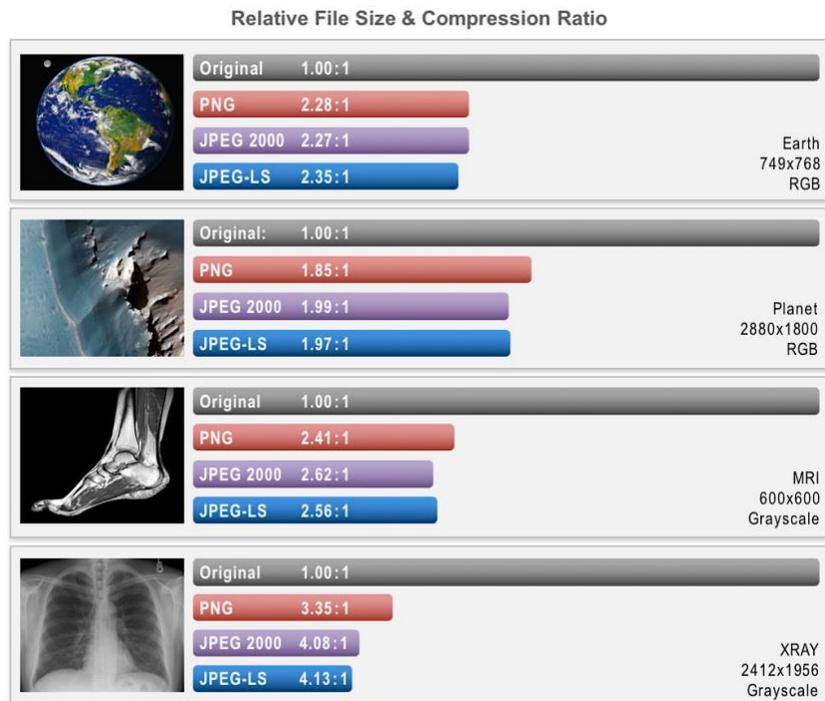
## CAST Adds JPEG-LS Decoder to Lossless Image Compression IP Core Suite

*CAST's JPEG-LS Encoder and Decoder provide a scalable, zero-latency, ultra-low-power hardware solution for numerically- or visually-lossless image compression*

**WOODCLIFF LAKE, NJ USA — June 12, 2018** — Semiconductor intellectual property provider CAST, Inc. has released a JPEG-LS Decoder IP core that—together with the JPEG-LS Encoder already available—provides an efficient hardware compression solution for the lossless or near-lossless transmission or storage of high quality images or video sequences.

The JPEG-LS cores provide:

- Superior compression ratios**, yielding smaller files than PNG and smaller or similarly sized files than JPEG 2000 (see figure);
- Ultra-low power consumption**, thanks to the low complexity of the JPEG-LS algorithm, which enables hardware implementations with an extremely small silicon footprint and minimal memory requirements;
- “Zero” (sub-millisecond) latency**, because the line-based processing employed by JPEG-LS does not impose any buffering of frames or even image lines before the encoding or decoding process is initiated; and
- Scalable throughput**, uniquely handling ultra-high resolutions and/or frame rates by internally combining and managing a configurable number of parallel processing engines.



Comparing the resulting file size and compression ratios of the PNG, JPEG 2000, and JPEG-LS lossless compression algorithms using typical images.

For example, consider the significant savings in hardware resources (16nm technology) possible for the lossless encoding and decoding of a 4K Ultra HD, 10-bit per color, RGB video stream at 30 frames per second:

<b><u>JPEG 2000</u></b>	<b><u>CAST JPEG-LS</u></b>
several million gates	350K gates
several Mbits of memory	300 Kbits of SRAM
more than 70mW	less than 10mW
tens of msec of latency	less than 0.5 msec of latency

Moreover, the CAST JPEG-LS encoder will yield a similar or even better compression ratio as the JPEG 2000 encoder, resulting in further resource savings system-wide.

Their competitive compression ratio with smaller hardware and lower latency make the JPEG-LS Encoder and Decoder cores an excellent choice for systems where artificial intelligence or video analytics process the video stream—such as for autonomous driving or augmented reality applications—because these systems typically do not accept image quality loss or any extra latency, while also requiring very low power consumption. Additional applications include those requiring high quality images with maximum file size savings, including space and medical imaging (JPEG-LS is part of the DICOM medical imaging standard).

## About the JPEG-LS IP Cores

The [JPEG-LS-E Encoder](#) and [JPEG-LS-D Decoder](#) each fully support the JPEG-LS, ISO/IEC 14495-1 standard, which is based on the LOCO-I (LOw COMplexity LOSSless COmpression for Images) algorithm developed by HP. The JPEG-LS-E has been used in products where decoding has been performed with standard software JPEG-LS decoders. The CAST Decoder appears to be the only such JPEG-LS decompression core commercially available; it can be used with the JPEG-LS-E or any other standard-conforming JPEG-LS encoder.

The JPEG-LS cores are easy to integrate and use, employing standard AXI-Stream and APB interfaces and operating standalone without processor intervention once programmed. Each is available in two versions, size-optimized, and scalable-throughput.

The single-pipeline, size-optimized versions process a single sample per clock cycle and require just one image line of buffering. The Encoder and Decoder can each handle several hundreds of Msamples per second when mapped to an ASIC technology; require as few as 40,000 ASIC gates; and run up to about 600 MHz and 350 MHz, respectively (on TSMC 16nm with SVT cells).

The multiple-pipe, throughput-optimized versions internally aggregate a user-specified number of the single-pipeline cores, handling multiple samples each cycle to efficiently process images or video with ultra-high resolutions and/or very fast frame rates. This scalable throughput capability appears to be unique to the CAST JPEG-LS cores.

The silicon-validated JPEG-LS Encoder and Decoder are available now, with royalty-free licensing for either ASICs (RTL) or FPGAs (netlists) from popular silicon providers.

## **About CAST**

In addition to the JPEG-LS cores, CAST offers a range of compression solutions and image processing functions; 8051 microcontrollers and extreme-low-power 32-bit BA2X™ processors; industry-leading automotive interfaces; and a variety of peripherals, interfaces, security, and other IP cores. CAST IP features easy integration and reuse, royalty-free licensing, and availability for ASICs or FPGAs from all leading silicon providers. Learn more by visiting [www.cast-inc.com](http://www.cast-inc.com), emailing [info@cast-inc.com](mailto:info@cast-inc.com), or calling +1 201.391.8300.

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CAST, Inc., 50 Tice Blvd, Suite 340, Woodcliff Lake, NJ 07677 USA • phone: +1 201.391.8300

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Media Contact: Paul Lindemann, Montage Marketing, [paul@montmark.com](mailto:paul@montmark.com), +1 603.490.4985