Video processing demands are on the rise from a wide variety of applications:

- The latest tablets and TVs support 4K resolution (surpassing 1080p resolution)
- Broadcast television cameras are capturing higher-fidelity images (up to 12b per pixel)
- The new video encoding standard, HEVC (or H.265), offers unsurpassed compression but requires significantly more processing than the current H.264 standard

The rapid move to these new standards and higher formats require programmable implementations as time to market is critical and the delay to build dedicated hardware could mean missing critical market windows. In addition, changes are still coming on all these fronts so programmable systems add the crucial ability to provide field upgrades as the industry moves to these new formats.

Texas Instruments’ multicore processors offer the high-performance processing capabilities that these applications require, with full programmability in a cost- and power-optimized package. In production now is TI’s TMS320C6678 DSP, based on the KeyStone architecture, which is available on standard form factor PCIe cards for video processing offload in existing servers (see Figure 1). Also sampling is TI’s 66AK2H12 System-on-Chip (SoC), based on the latest KeyStone II architecture (see Figure 2 on the following page). The 66AK2H12 adds a quad ARM® Cortex™-A15 MPCore™ processor cluster to eight TMS320C66x TI DSPs and allows for new, optimized server architectures to be designed for this market.

Making video infrastructure development simple, flexible and slashing time to market

There are a number of challenges facing the video infrastructure market ranging from simply supporting the vast amount of video traffic to supporting the latest and greatest video encoding/decoding standards. The biggest challenge currently is the need to support the
new High Efficiency Video Coding (HEVC or H.265) standard. The standard is still currently under definition but is expected to be ratified very soon. HEVC improves data compression by up to 50% over the current state-of-the-art and with the increasing amount of high-definition (HD) video traffic, this is a huge benefit. In addition to providing flexibility in the network, there is also the issue of encoding data at the camera. When video is being captured at a live event, it also needs to be compressed and sent back to the studio for editing prior to broadcasting and often times the requirements are higher for this than for normal transmission as the broadcasters would like to keep the quality as high as possible prior to editing. A key benefit of TI’s multicore product line is the ability to support large-scale deployments as found in data centers as well as the ability to support high-end camera systems in the field. This allows a wide range of products to be developed quickly, leveraging the KeyStone architecture to scale from smaller to larger-scale systems.

TI provides a Multicore Video Software Development Kit (MCSDK-Video) to get developers going quickly with optimized coding implementations (see Figure 3). Using the MCSDK-Video and either standalone evaluation modules, or off-the-shelf PCIe cards, such as Advantech’s lightning DSP cards, differentiated systems can be quickly created that are both flexible and cost/power conscious. Figure 4, on the following page, shows the performance capabilities of the DSPC-8682 PCIe card as well as the DSPA-8901.
66AK2H12 SoC offers new architecture possibilities

The integration of the quad Cortex-A15 cluster in TI’s 66AK2H12 SoC allows efficient systems to be built without the need for a separate host processor. With full support of Linux (both commercial and open) the 66AK2H12 SoC allows existing code to be ported simply and easily to the new SoC. The processing power of the DSPs can then be easily accessed using standard multicore programming protocols such as OpenMP and OpenCL, both of which are supported on TI processors. In addition, the quad Cortex-A15 clusters can run full networking and protocol stacks taking advantage of the on-board network coprocessors. With the large number of high-speed interfaces the 66AK2H12 SoC not only supports traditional server architectures and Advanced TCA designs, but new architectures optimized for video processing could also be easily developed.

For more information about TI’s KeyStone-based DSPs and SoCs, please visit www.ti.com/multicore.

<table>
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<tr>
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<tr>
<td>AVC-Intra 100, 10-bit, 4:2:2, 60 fps</td>
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</tbody>
</table>

Figure 4. Performance capabilities of the TI-based PCIe and ATCA cards

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