

Video Infrastructure

Applications of the K2E and K2H platforms in video infrastructure equipment



Texas Instruments' K2E and K2H System-on-Chip (SoC) platforms, based on the KeyStone II multicore architecture, provide the leading power, performance and flexibility for video infrastructure applications. These SoCs offer a unique combination of high-performance processors and high-speed interfaces. With a combination of ARM® Cortex™-A15 MPCore™ processors and TMS320C66x DSP cores, devices in the K2H platform are well suited to provide scale and density for video processing. With 10G Ethernet interfaces with built-in switching and integrated packet and security AccelerationPacs, devices in the K2E platform are ideal for meeting video transportation needs.

Many segments of the video delivery chain, as depicted in Figure 1, are undergoing rapid changes including content creation, distribution and video broadcasting. The transition to digital TV and increasing popularity of Over-the-Top (OTT) and "TV Everywhere" services are driving corresponding changes to the supporting infrastructure.

With video traffic growing at an accelerating pace there is a growing focus on making optimal use of network capacity. This, in turn, is expediting adoption of efficient codecs such as High Efficiency Video Codec (HEVC), which can reduce the size of video streams by up to 50% over existing state-of-the-art codecs. Given the demand for video and the

	ARM® Cortex™-A15	C66x DSP	5-Port 1GbE Switch	3-Port 10GbE Switch	NetCP
K2E					
AM5K2E02	2	0	1	0	1
AM5K2E04	4	0	2	2	2
66AK2E05	4	1	2	2	2
66AK2E02	1	1	1	0	1
K2H					
66AK2H12	4	8	1	0	1
66AK2H06	2	4	1	0	1

Table 1 – Devices in the KeyStone II architecture

cost of increasing network bandwidth, there is tremendous pressure to adopt these new standards as quickly as possible. These codecs are highly complex and require a great deal of processing power, making the 66AK2H12, with a quad-Cortex-A15 processor cluster running at 1.4 GHz and eight DSP cores running at 1.2 GHz, an ideal platform for implementing these demanding codecs (see Figure 2 on the following page). Developers using the 66AK2H12 SoC to implement HEVC and other advanced codecs can not only get to market quickly on a fully programmable and flexible system, but can also achieve best-in-class cost and power-per-channel using these highly integrated SoCs.

Delivering high-quality video, whether streaming to end customers or transferring

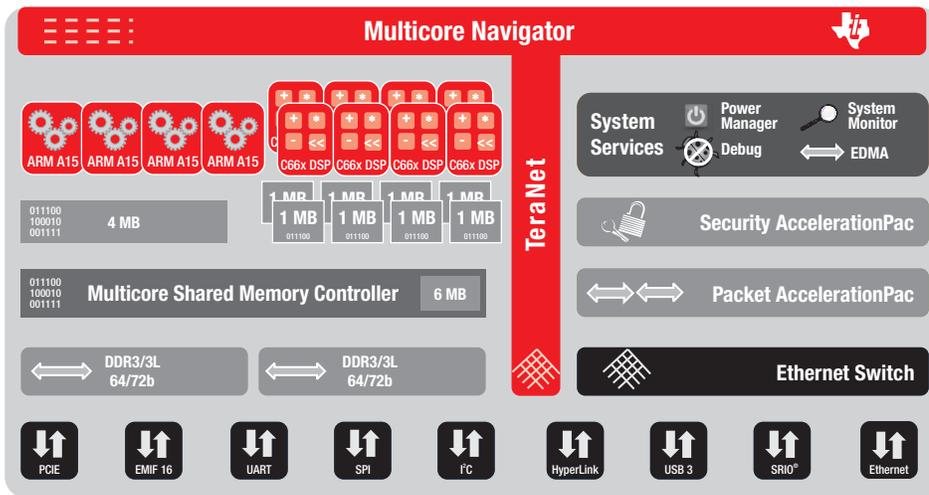
between production facilities as part of automation flows, requires transport infrastructure that can implement QoS and other reliability features such as per hop Forward Error Correction (FEC). With its high-speed Ethernet interfaces, a built-in switch and a network co-processor, the K2E platform is well suited to serve the needs of these applications. A device configuration of four Cortex-A15 processors is depicted in Figure 3 on the following page. Other configurations with one or two Cortex- A15 processors together with one C66x DSP core are also available.

Application Segments

Video Contribution: Video contribution includes includes high-end professional cameras that are used to generate video content for post production and editing. High-resolution content and frame-by-frame compression are commonly used in this equipment to provide both low latency and high video resolution. With its high-performance



▲ Figure 1 – Video delivery chain



▲ Figure 2 – TI's 66AK2H12 SoC with four Cortex-A15 processors and eight C66x DSP cores

DSP cores, devices in the K2H platform are well suited for implementing encoders such as JPEG 2000 and H.264 AVC Intra. K2H devices utilize a packet-based internal interconnect called Multicore Navigator that enables optimal codec implementation that is distributed across multiple cores. In addition, gigabit interfaces on these devices, together with a KeyStone AccelerationPac for packet processing, provide flexibility in interfacing with emerging IP-based workflows.

Video Production: Format conversion, audio insertion and decoding/encoding are typical functions that fall into this equipment category. New production workflows to support Adaptive Bit Rate Streaming protocols such as HTTP Live Streaming (HLS), require encoding multiple copies of original video making the K2H platform an excellent match for these applications.

Video Distribution: A wide variety of equipment such as Content Delivery Network (CDN) transcoders, Quality of Experience (QoE) monitoring systems, local ad-insertion devices and video servers constitute this category. In particular, the shift to IP-based transport networks is driving new infrastructure needs in this area. Use cases such as multi-viewers and local ad insert are pushing the need for even more transcoding and transrating. Depending

upon the specific application, devices in both K2E and K2H platforms can be used to meet both video processing and networking requirements.

Other Applications That Fall Under Video Infrastructure Include:

- Virtual desktop infrastructure (VDI)
- Video gateway
- Cloud gaming

Development Support

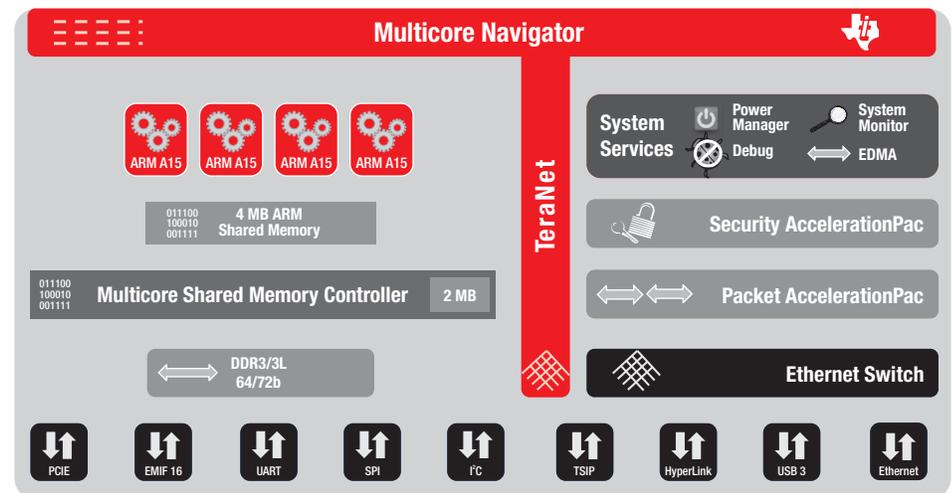
In addition to low-cost evaluation modules (EVMs), TI provides a comprehensive set

of tools and software to assist in product evaluation and help developers get their products to market faster. In addition to low-level drivers, TI offers both Linux™ and SYS/BIOS™ operating systems. Built on top of this is a Multicore Software Development Kit (MCSDK) that provides higher level abstraction to simplify development. MCSDK-Video uses the MCSDK to build demonstrable real-time video capabilities on a Linux desktop by accessing DSP acceleration over a PCIe interface. In addition to custom transport, MCSDK-Video utilizes OpenCL to access DSPs as video acceleration engines. TI supplies a number of video encoders and decoders free of charge, further enabling the creation of cost-effective solutions. Finally, TI supplies an Eclipse-based debugging and simulation environment to facilitate fast development cycles.

To download TI's multicore software, libraries and tools please visit www.ti.com/multicore.

Related TI Solutions

Starting with analog and mixed-signal solutions, TI has a broad portfolio of products that play a leading role in broadcast and professional video segments. TI's OMAP™ and Sitara™ product families complement the infrastructure portfolio by providing power-efficient and cost-effective client-side solutions.



▲ Figure 3 – TI's AM5K2E04 SoC with four Cortex-A15 processors

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