

# Multicore Fact Sheet



## **Overview:**

TI multicore devices simplify the process of implementing multicore application-specific solutions by offering the tool set and supporting application expertise that customers need to win in their markets.

- Customers can access both optimized homogeneous and heterogeneous architectures across a wide variety of end equipments that are supported by software, development environments, hardware tools and application knowledge.
- Customers can improve system efficiency and performance while reducing the development complexity often associated with multicore implementations.
- Customers will continue to save time to market and reduce their risk when implementing multicore solutions from TI by leveraging its twelve plus years of experience, leading silicon and partnerships.

## **What is a multicore device?**

A multicore device has more than one programmable processor on the same silicon die. This can be either homogeneous with two or more of the same core, or heterogeneous with two or more different cores on the same die.

Homogeneous solutions may either be synchronous in that all of the cores are running the same code or applications or asynchronous where each core may be running different portions of the code or different applications altogether.

## **TI multicore solutions:**

TI offers several multicore architectures across a variety of product families, including TMS320™ DSPs, digital media processors based on DaVinci™ technology, MCUs, and OMAP™ technologies. These architectures span a wide variety of applications including automotive, industrial, medical, communications infrastructure, video, and wireless handsets.

## ***TMS320 multicore DSPs***

- **TMS320VC5420/21:** Two independent TMS320C54x™ DSP cores capable of core-to-core communications targeted for telecom applications. Processors provide one program memory bus, three data memory buses, arithmetic logic unit (ALU) for high degree of parallelism, application-specific hardware logic, on-chip memory, and additional on-chip peripherals.
- **TMS320VC5441:** Quad core with four C54x™ DSPs with shared program memory targeted for telecom applications. The C5441 is a high-performance, low-cost, high-density DSP for remote data access or voice-over IP subsystems. It is designed to maintain the current modem architecture with minimal hardware and software impacts, thus maximizing reuse of existing modem technologies and development efforts.
- **TMS320VC5470/71:** Dual core with a C54x DSP and an ARM7TDMI RISC MCU targeted for IP Phones. The DSP subsystem includes 72K x 16-bit SRAM, a timer, a DMA controller, an external memory interface, and two McBSPs. The MCU subsystem includes three timers, general-purpose I/O, and an external memory interface.
- **TMS320C6474:** Integrates three TMS320C64x+™ cores running at 1 GHz each on a single die, delivering 3 GHz of DSP performance. It is based on the third generation high-performance, advanced VelociTI™ very-long-instruction-word (VLIW) architecture developed by TI, and is code compatible with TI's single core DSPs based on the C64x+ core.
- **TMS320C6472:** The industry's most power-efficient multicore processor integrates six TMS320C64x+™ cores. The device delivers up to 4.2 GHz of processing capability for high-end applications where performance and energy efficiency are critical, and includes a low-cost EVM to make evaluating the C6472 easy and affordable.

## ***Multicore digital media processors based on DaVinci™ technology***

- **TMS320DM644x:** These devices are based on an ARM926 processor and the C64x+ DSP core. They (DM6446, DM6443 and DM6441) are targeted for applications such as videophones, automotive infotainment, digital still cameras, streaming media and IP set-top box. The complete DaVinci software infrastructure, from low-level OS drivers to application APIs, makes it possible for developers to implement digital video without having to focus resources on writing and optimizing codecs or programming a DSP.
- **TMS320DM6467:** This device integrates an ARM926 processor, the C64x DSP core and a high-definition video co-processor, conversion engine and targeted video port interfaces specifically tuned for real-time, multi-format, high-definition (HD) video transcoding. This processor is ideal for media gateways, multi-point control units, digital media adaptors, video security DVRs and IP set-top boxes.

## **Multicore MCUs**

- **MSP430:** These industry leading, ultra-low power MCUs are used in a variety of industrial and consumer applications. The heterogeneous MSP430FE42xx devices target electrical energy metering with an embedded signal processing (ESP) core along with the 16-bit MSP430 core.
- **C2000:** The C2000 MCU family enables real-time control in a variety of embedded applications. With a high-performance 32-bit CPU and industry-leading control peripherals, C2000 is ideal for applications that need the extra edge in functionality and flexibility. The Piccolo F2803x line introduces the Control Law Accelerator (CLA), and fully independent 32-bit floating-point math accelerator that runs in parallel with the C28x core.
- **TMS570:** The TMS570 devices are the industry's first Cortex™ ARM® R4 and Cortex™ ARM M3 based MCUs, targeting safety critical and driver assistance automotive applications. TI offers TMS570 with a patent pending implementation of the lock-step Cortex ARM R4 cores on a single device as well as dual core offerings of Cortex ARM R4 plus Cortex ARM M3 on a single device. The TMS570 multi-core devices offer performance, safety and rich peripheral MCU integration such as timers, ADC, CAN, and FlexRay™.

## **Multicore OMAP™ processors**

- **OMAP5910:** Dual-core architecture with a TMS320C55x™ DSP core and a TI925 ARM core to meet the application processing needs of embedded devices. Targeted at mobile communications, video products (that need MPEG4, JPEG, Windows® Media Video, graphics and video accelerators), advanced speech applications, audio processing applications (that need MPEG-1 Audio Layer3 [MP3], AMR, WMA, AAC, and other GSM speech codecs), and data processing applications for fax, encryption/decryption, authentication, signature verification and watermarking.
- **OMAP5912:** Dual-core architecture with a C55x DSP core and an ARM926EJ-S ARM core. Targeted at mobile communications, video products (that need MPEG4, JPEG, Windows® Media Video, graphics and video accelerators), advanced speech applications, audio processing applications (that need MPEG-1 Audio Layer3 [MP3], AMR, WMA, AAC, and other GSM speech codecs), and data processing applications. These devices are designed to run leading open and embedded RISC-based operating systems, and TI DSP/BIOS™ software kernel foundation.
- **OMAP 2 processor family:** Based on TI's enhanced OMAP 2 multi-engine parallel processing architecture and high performance / low-leakage 90-nm CMOS process technology, the OMAP2430 / OMAP2431 provide the ultimate balance between multimedia performance, flexibility, power and cost.
- **OMAP 3 processor family:** Designed to meet the needs of the multimedia enabled handsets as well as the non-handset market, which includes VGA quality video camcorder and playback, up to 5-megapixel still image capture, music playback and 3D gaming. The OMAP 3 processors offer a variety of combinations of the Cortex-A8 core, multimedia-rich peripherals, OpenGL® ES 2.0 compatible graphics engine, video accelerators and C64x+ DSP core.

- **OMAP-L1x:** OMAP-L1x application processors include ARM9 and ARM9-plus-DSP architectures and offer a variety of peripherals for networking and run Linux or the DSP/BIOS™ real-time kernel for operating system flexibility. The product line is also pin-for-pin compatible with various devices in the new TMS320C674x and C640x product lines. Power consumption ranges from 8 mW in standby to 400 mW total power.
- **OMAP 4 processor family:** Designated for the Smartphone and Mobile Internet Device (MID) markets which require full HD1080p, multi-standard video encode/decode, faster, higher-quality image and video capture with digital SLR-line imaging up to 20 megapixels and advanced graphics including 3D gaming and 3D user interfaces. OMAP 4 processors leverage four powerful, high-performance processing engines including the dual-core ARM Cortex-A9 MPCore™ supporting Symmetric Multiprocessing (SMP). They also include a multimedia engine based on TI's C64x DSP and power-efficient, multi-format hardware accelerators, Imagination Technologies' POWERVR SGX540 graphics engine and a dedicated Image Signal Processor (ISP).

### ***Helping customers win in their markets***

Customers have been shipping products that have contained over one billion TI multicore devices over the past ten years. Unlike other multicore providers, customers can leverage the best technology available for the specific applications along with the many tools TI employs to meet specific applications requirements like power, performance and space requirements.

### ***Automotive***

- To improve customer safety, Bosch, the leading automotive OEM, chose TI to develop the first homogenous MCU for safety critical applications. Running in a synchronous mode the TMS570 device was the first to achieve IEC 61508 compliance, the highest level of safety and reliability for automotive applications.
- By using the TMS570 processor, developers of safety critical automotive applications greatly reduce the software development time, board space and EMI through the elimination of additional MCUs.

### ***Communications Infrastructure***

- According to iSuppli, TI has over 80 percent market share for 3G and 2G wireless base stations, as well as leadership positions in emerging 4G standards such as WiMAX and LTE.
- The **TCI6487** high-performance DSP with three independent DSP subsystems is suitable for wireless infrastructure baseband applications. At the heart of each subsystem is a 1.2-GHz C64x+ DSP core. Because it is modular and scalable in nature, it is suitable for pico, micro and macro base stations across UMTS, TD-SDMA, WiMAX, GSM/EDGE and cdma2000 standards.
- TI's **TCI6488** includes three DSP cores, running at 1 GHz per core to support all the functions of a macro base station in a single chip. Designed specifically to optimize processes at a system level, the TCI6488 "baseband on a chip" eliminates the need for FPGAs, ASICs and other bridging devices, reducing the total bill of materials for OEMs and service providers by up to a factor of five.

- The **TCI6489** multicore femtocell solution includes three high-performance 850 MHz C64x+™ DSP cores, delivering 2.55 GHz of performance. It is ideal for enterprise or "super femto" applications, and supports up to 32 users.
- The **TNETV3020** processor targets high density core networking applications with six high performance DSPs with dedicated blocks for Level 1 data and instruction cache, as well as Level 2 cache, along with shared memory. This combination makes the TNET device ideal for H.263, MPEG-4 and CIF functions for video, and also helps expands voice codec channels.
- TI has also introduced a new **multicore SoC architecture** – based on the C6x family of DSPs – offering a common platform for communications infrastructure vendors to build a broad range of products, including wireless base stations, media gateways, and networking and video infrastructure equipment. TI's simplified design approach integrates fixed and floating point processing, and delivers more than five times the performance of today's solutions.

### **Video**

- Enabling customers to develop innovative video applications DaVinci technology "is clearly a landmark in consumer electronics," according to Chris Crotty, senior consumer electronics analyst, iSuppli.
- The **TMS320DM6446** processor combines an ARM926 core – ideally suited for handling host control – with a leading C64x+ DSP for video processing, analytics and other intensive applications. Customers have reported that the DM6446 processor results in a 30 percent BOM reduction when compared to a discrete solution.

### **Mobile communications and mobile computing**

- TI is the number one supplier for wireless applications processors which includes mobile phones and converged devices (Source: Forward Concepts, July 2009).
- The **OMAP3430** is the first multicore processor in the industry to integrate the ARM Cortex-A8 superscalar core. Combined with TI's technology in the OMAP3430, the ARM Cortex-A8 enables faster user interfaces, faster data access and boosts productivity and entertainment applications on the mobile phone, while maintaining power efficiencies expected in a handset.
- With the introduction of the **OMAP 4 processor family**, TI is leveraging the dual-core Cortex-A9 MP core supporting symmetric multiprocessing (SMP). The powerful combination of programmability and multi-core performance provides flexibility to support new and emerging applications and standards for the mobile communications and mobile computing markets. Devices featuring this platform will deliver new, stunning, multimedia-rich user experiences such as 1080p video record and playback, 20-megapixel imaging and approximately a week of audio play time.

## **Industrial**

- According to the Embedded Processing Survey conducted by CMP, the **MSP430** MCU consistently makes the list of most preferred 16-bit MCUs available.
- With high integration for SoC functionality and industry leading low power the dual core **MSP430** series of MCUs enable a five to one reduction in system components for sensing applications like e-metering and can save up to 30 percent of lost power associated with typical mechanical meters.

In summary, TI offers a broad range of multicore devices that deliver the high performance and power efficiency that customers require across a broad range of applications and end markets. Additionally, TI's robust development environment and breadth of systems and software expertise allows TI customers to reduce their time to market, allowing them to market fast with innovative and differentiated products.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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