

## Zynq-7000 All Programmable SoC



### The Challenge:

#### The Need for More Processing Power

- Solutions require more than just a processor
- Secure system with familiar development environment
- Design flexibility for product differentiation and expansion

### The Solution:

#### Zynq-7000 SoCs

- Single-chip integrated processor and programmable logic solution reduces design complexity
- Best-in-class performance-per-watt
- ASIC-level performance with flexibility
- Extensive library of industry-standard tools and IP
- Integrated system offers high physical security

### INDUSTRY STANDARD SOC

## Integrated Hardware and Software Programmability for Cost-Sensitive Markets

The Zynq®-7000 All Programmable SoC redefines possibilities for embedded systems, giving system architects and software developers a flexible platform to launch new solutions, while providing traditional ASIC and SoC users a fully programmable alternative. ARM® Cortex™-A9 processors, integrated with the industry's leading performance-per-watt 28nm programmable logic, achieve power and performance levels exceeding that of discrete processor and FPGA systems. Available in dual-core (Zynq-7000 devices) and single-core (Zynq-7000S devices) Cortex-A9 configurations, the Zynq-7000 family boasts the best price to performance-per-watt in its class, making it the best option for a wide range of embedded applications, including small cell base stations, multi-camera drivers assistance systems, machine vision for industrial automation, medical endoscopy, and 4K2K Ultra-HDTV.

## Racing Highly Differentiated Applications to Market

Enabling these silicon capabilities is the most extensive library of industry-standard tools and IP, which leverages the ARM partner community and is bolstered by Xilinx's Vivado® Design Suite and Vivado High Level Synthesis (HLS) tool. Complete with Xilinx's SDSoc™ development environment, the industry's first C/C++ full-system optimizing compiler, the software ecosystem enables design teams to go from concept to working implementation in the absolute minimum amount of time, allocating more resources to focus on system features. More time for optimization, algorithm development, and feature extensions ultimately creates highly differentiated products, from cost-effective to feature-rich and high performance.

## Unmatched Flexibility for Cost-Sensitive Embedded Designs

Integrated programmable logic on the Zynq-7000 SoC is connected to a processing system with over 3,000 interconnects, providing up to 100Gb/s of I/O bandwidth, beyond that of a multi-chip solution. The Zynq-7000 SoC single-chip solution enables customization for almost any design requirement. Need more processing power? Offload compute-intensive tasks to the programmable logic. None of the integrated peripherals meet your need? Build the one you need on the programmable logic. Need deterministic, real-time processing? Build a MicroBlaze soft processing core on the logic as a real-time co-processor to the Cortex-A9. With 10 different single-core or dual-core devices to choose from, Zynq-7000 SoCs give you a scalable platform for an entire family of solutions.

The Zynq-7000 family comprises single and dual ARM Cortex-A9 equipped devices, providing processor scalability across the platform:

**Zynq-7000S** devices are the cost-optimized entry point to the Zynq-7000 SoC platform. With a single-core ARM Cortex-A9 processor mated with 28nm Artix®-7 based programmable logic, Zynq-7000S devices are ideal for industrial IoT applications such as motor control and embedded vision.

**Zynq-7000** devices are optimized for performance-per-watt and maximum design flexibility. Dual-core ARM Cortex-A9 processors are integrated with 7 series programmable logic (up to 6.6M logic cells of logic and 12.5Gb/s transceivers) to enable highly differentiated designs for a wide range of embedded applications.

**FEATURES OVERVIEW**

<p><b>Dual- or Single-core ARM Cortex-A9 with CoreSight™ Technology</b> Unmatched performance-per-watt</p>	<ul style="list-style-type: none"> <li>• ARM Cortex-A9 processor chosen for optimal performance-per-watt ratio in popular applications</li> <li>• Single and double-precision floating point support</li> <li>• Up to 1GHz operation</li> </ul>
<p><b>Largest and Highest-Performance Memory System</b> Features the fastest memory controllers and largest on-chip memory in its class</p>	<ul style="list-style-type: none"> <li>• 512KB L2 Cache</li> <li>• 256KB On-Chip Memory fits an entire real-time operating system</li> <li>• Integrated memory controllers support up to DDR3-1866</li> </ul>
<p><b>7 Series 28nm Programmable Logic</b> HPL process for optimal performance-per-watt</p>	<ul style="list-style-type: none"> <li>• Artix®-7 FPGA logic for low power and low cost</li> <li>• Kintex®-7 FPGA logic for best price/performance/watt</li> </ul>
<p><b>Integrated Memory Mapped Peripherals</b> Leverage commonly used protocols</p>	<ul style="list-style-type: none"> <li>• 2x USB 2.0 (OTG) w/DMA</li> <li>• 2x Tri-mode Gigabit Ethernet w/DMA</li> <li>• 2x SD/SDIO w/DMA</li> <li>• 2x UART, 2x CAN 2.0B, 2x I2C, 2x SPI, 32b GPIO</li> </ul>
<p><b>All Programmable Power Management</b> Multiple power optimization technologies across processing system and programmable logic</p>	<ul style="list-style-type: none"> <li>• Flexible, tunable power envelope for adjustable processor, interconnect, and memory speeds</li> <li>• ARM low power modes</li> <li>• Partial reconfiguration to reduce programmable logic requirement</li> </ul>
<p><b>AMBA Open Standard Interconnect Ports</b> High bandwidth interconnect between processing system and programmable logic</p>	<ul style="list-style-type: none"> <li>• 64-bit AXI ACP port for enhanced hardware acceleration and cache coherency for additional soft processors</li> <li>• Up to 100Gb/s bandwidth between PS and PL</li> </ul>
<p><b>Massive Parallel Signal Processing</b> Enables hardware acceleration including video processing and analytics</p>	<ul style="list-style-type: none"> <li>• Dedicated, full custom, low-power DSP slices</li> <li>• Up to 2,020 DSP blocks delivering over 2,662 GMACs</li> </ul>
<p><b>Advanced Security, Safety &amp; Reliability</b> State of the art technology for hardware, secure system boot, and software execution</p>	<ul style="list-style-type: none"> <li>• Processor-first boot using on-chip-memory with secure ROM code</li> <li>• Anti-Tamper (AT) technology can 'zeroize' the device if tampering is sensed</li> <li>• Secure system boot with RSA-based authentication, AES-256 decryption, and SHA-256 data authentication</li> <li>• Full ARM TrustZone® support</li> </ul>

**Software and Ecosystem Features** *Xilinx Offers Full, End-to-End, No-Charge Software and Tools Solutions*

**Real-Time Operating Systems**

Comprehensive collection from open-source to best-in-class commercial operating systems

- Linux – For general-purpose computing. Available as source code on GitHub, within Xilinx PetaLinux, or as industry-standard Yocto recipes
- FreeRTOS – Ideal for simple, high-performance tasks
- Bare-Metal – Best for high-performance, low-level applications
- Android – For feature-rich, user-friendly graphical applications

**Development Tools**

SoC-centric tools and familiar environments to develop software and hardware on both the processing system and programmable logic

- Xilinx Software Development Kit (XSDK) tools – Manage the full development and debug cycle for multiprocessor designs
- SDSoC development environment – Compiles C/C++ applications into an optimized, fully functional Zynq-7000 AP SoC system
- Vivado Design Suite – Implement hardware designs with RTL or High Level Synthesis

**Reference Designs and IP Block Portfolio**

A solid foundation for value added custom designs

- Xilinx-verified reference designs included in hardware development kits
- Extensive Alliance partner reference designs available
- Expansive IP block catalog for accelerators and peripherals across most application spaces

**Hardware Development Platforms**

Platforms ship fully equipped and ready for immediate system design

- MiniZed Development Kit - Entry-level Zynq-7000S SoC development board with Bluetooth connectivity
- Zybo-Z7 Development Board - Low-cost video-capable board
- ZC706 Evaluation Kit – Expands ZC702 with high-speed serial transceivers

**Virtual Development Platforms**

Prototype designs without the hardware requirements

- Zynq-7000 AP SoC Virtual Platform by Cadence, for both processing system and programmable logic development
- QEMU complete emulation platform of the Zynq-7000 AP SoC for fast software development, architecture investigation, and design porting

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## Boards and Kits

Xilinx and its Alliance partners offer a broad array of evaluation kits that enable rapid development for highly differentiated embedded applications based on Zynq-7000 AP SoCs. This includes all the basic components of hardware, design tools, IP, and pre-verified reference designs. To learn more, visit: [Zynq-7000 AP SoC Boards and Kits](#).



[Avnet MiniZed™](#)



[Digilent Zybo Z7 Development Kit](#)



[Xilinx Zynq-7000 All Programmable SoC ZC702 Evaluation Kit](#)



[Xilinx Zynq-7000 All Programmable SoC ZC706 Evaluation Kit](#)



[Avnet MicroZed™ Evaluation Kit](#)



[Avnet PicoZed™](#)