**RMI CORPORATION** ®

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# XLR700 Processor Series
## *Next Generation Multiprocessing*

**PRODUCT BRIEF**

# Throughput-Optimized MIPS64 Multi-Core Processors

## Overview and Benefits

The XLR700 series scalable communication processors from RMI® are designed to address IP networking, VoIP, wireless LAN, 3G wireless, broadband, storage, routing and switching, security, and telecommunication applications, along with the growing need to scale OEM's software and hardware investments.

The XLR732 and XLR716 processors integrate general purpose processing, high level programmability, scalability with thread processing, intelligent packet management, and the ability to combine control plane, data plane and security operations on a System-on-Chip (SoC) processor.

Based on RMI's throughput-optimized multi-core multi-threaded SoC architecture, the XLR732 processor integrates 32 fine-grain threads using eight MIPS64® CPUs, while the XLR716 processor integrates 16 fine-grain threads using four MIPS64® CPUs. Both processors contain three full speed on-chip interconnects, large multi-level caches, autonomous accelerators, quad memory controllers, native 10 Gigabit Ethernet MACs, and other integrated I/Os.

The integrated peripheral I/O of the XLR732 series allows seamless integration into current and future platforms. The dual XGMII/SPI-4.2 ports, quad RGMII ports, and HyperTransport controller facilitate high throughput data connections in Advanced Telecommunications Computing Architecture (ATCA), Advanced Mezzanine Card (AMC), bladed, proprietary fabric, backplane, and standalone planar based solutions.

The combination of dense computational performance, security acceleration and network awareness makes the XLR732 processor an exceptional solution for enhancing existing platforms, or for new developments in wired and wireless networking applications, such as deep packet inspection, content switching, routing, load balancing, and cryptography at line rates exceeding 10Gbps.

The key to the performance and scalability of the XLR732 and XLR716 processors is the multi-threaded CPUs coupled with RMI's Fast Messaging Network (FMN). Each XLR® processing core contains four tightly integrated hardware threads capable of mitigating latency, improving computational efficiency and throughput. Each core has the equivalent throughput of four single threaded CPUs. These are just several of the many advanced technologies found in the XLR700 processor series.

The XLR processor family is supported by a comprehensive software development kit (SDK) that contains reference and production-ready software components, including the RMIOS (accelerated operating system), device drivers for open source Linux and commercial operating systems, complete tool chains, diagnostics, and the RMI firmware suite. The SDK enables customers to quickly develop or migrate existing software to easily design high-performance, feature rich solutions.
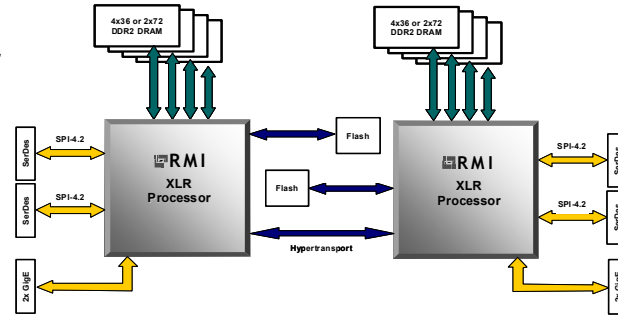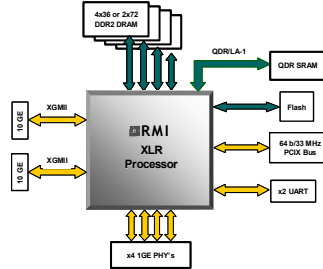
## Block Diagram
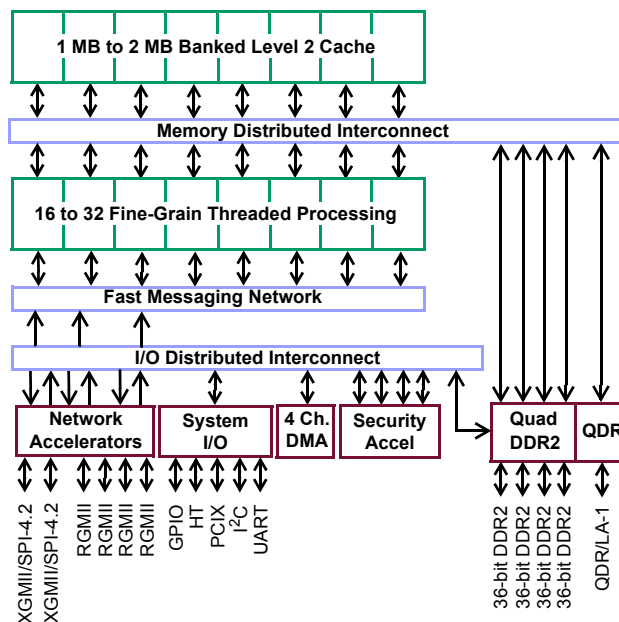


## Product Availability

The XLR732 and XLR716 processors are available in a RoHS-compliant 1605 BGA package. There are different power grades (standard, low power and ultra low power) as well as commercial and industrial operating temperatures. The XLR732 is pin compatible with the XLR716 processor. Both of these products are also pin compatible with the XLR532 and XLR516 processors.

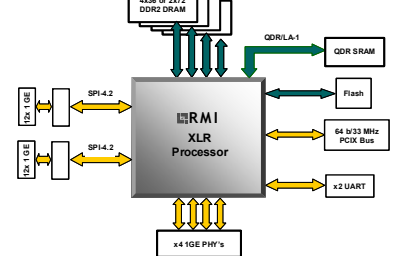Also available from RMI are evaluation platforms for the entire product family.

**RMI Corporation**                                                                **2008-09-02 10768V200PB-PR**

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## Application Examples

**_Unified Threat Management_**
_2x10GE + 4x1GE Platform_

**_Carrier Grade_**
_10+ Gbps ATCA Blade_

**_Wireless LAN or Content_**
_28x1 GE Switch_

*(Block diagrams showing RMI XLR Processor configurations with 4x36 or 2x72 DDR2 DRAM, QDR SRAM, Flash, PCIX Bus, UART, SPI-4.2, SerDes, GigE, XGMII, HyperTransport, GE PHY interfaces.)*

## Features and Highlights

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|---|---|
| **Next Generation Processor Cores**<br>• 64-bit MIPS64® ISA with enhanced instructions<br>• Up to 8 MIPS cores, each 4-way multi-threaded<br>• Up to 32 fine-grain thread processing<br>• Programmable thread scheduling policies<br>• Branch Prediction and TLBs<br>• 800 MHz - 1.2 GHz operation | **General Purpose Programming**<br>• Virtual MIPS® mode isolates cores and enables virtualization of unmapped memory regions<br>• Supports both clustered and SMP modes<br>• 3 fine and coarse grained scheduling modes / CPU<br>• Supports parallel, pipelined, and hybrid processing modes<br>• On-chip debug support with performance monitoring |
| **Cache Subsystem**<br>• Fully cache coherent MOSI protocol<br>• 8-way set associative architectures<br>• 32KB ECC protected L1 writeback data cache<br>• 32KB Parity protected L1 instruction cache<br>• Up to 2MB ECC protected banked writeback L2 cache | **Integrated System Interfaces**<br>• PCMCIA interface<br>• Flash memory interfaces<br>• Dual I²C interfaces<br>• Dual 16550 UART interfaces<br>• 32-bit GPIO interface<br>• IEEE 1149.1 JTAG and BIST functionality |
| **High Speed Distributed Interconnects**<br>• High-speed core frequency non-blocking Data Interconnection Ring connect all cores, caches, memory, acceleration engines, and I/O<br>• 10 simultaneous memory transactions per clock<br>• Non-blocking split transaction operations<br>• Fast Messaging Network non-instrusively passes/transmits packet descriptor and control messages among CPUs, acceleration engines and I/Os. | **High Performance Memory Controllers**<br>• Quad DDR2 DRAM controllers with nibble error correction<br>• 4 x36 or 2 x72 mixed memory use per x72 DRAM channel<br>• QDR2 SRAM and LA-1 interface<br>• 4-channel DMA controller with built in CRC generation |
| **Leading Edge Security Engine**<br>• Up to 10 Gbps of bulk encryption / decryption<br>• Up to 4 high-speed crypto engines<br>• Kasumi, DES/3DES, AES/AES-GCM, ARC4 (128, 192, 256)<br>• MD5, SHA-1, SHA-256 (All HMAC)<br>• DH and RSA Exponentiation<br>• Random number generator | **Extensive Networking and I/O Interface Options**<br>• Dual SPI-4.2 interfaces (16 ports)<br>• Dual 10G Ethernet MACs (XGMII)<br>• Quad 10/100/1000 Ethernet MACs (RGMII)<br>• Packet distribution and order sequencing hardware<br>• PCI-X - 64/32-bit 133-MHz (PCI 2.2) Master or Target<br>• HyperTransport - 8-bit, 3.2 GB/s with PIC |
| **Networking Hardware Accelerator**<br>• Packet distribution engine for line rate processing<br>• Packet ordering assists<br>• TCP checksum verification / generation | **Power Management**<br>• Dynamic clocking control<br>• On-chip thermal sensor<br>• Software programmable clock throttling |