PRODUCT OVERVIEW

The OCTEON III CN78XX family of Multi-Core MIPS64 Processors builds on the award winning OCTEON II family, with a higher number of improved cnMIPS64 cores, wider range of I/O, higher application acceleration for networking, security and storage, larger caches, latest interfaces such as DDR4 and PCIe Gen3, and multi-chip coherent connectivity using Marvell Coherent Processor Interconnect (CCPI) for enabling high performance applications. The family includes three software and pin-compatible processors, with 24 to 48 cnMIPS64 v3 cores running at up to 2.5GHz, rich hardware virtualization compliant with MIPS64 Release 5, four DDR4 and DDR3 channels and over 100Gbps of application acceleration performance. Built on high-performance low-leakage 28nm process technology, along with on-chip power gating and real-time power optimizer, this family delivers the highest compute and services performance of any standard ISA processor with the highest performance per watt. The CN78XX family provides extremely high-bandwidth connectivity based on the latest standards-based SERDES I/Os including XLAUI, PCIe Gen3, XAU1, Double-speed XAUI, XFI, RXAUI, and Interlaken.

BLOCK DIAGRAM

![OCTEON® III CN78XX - Block Diagram](image-url)
## OCTEON III CN78XX Multi-Core MIPS64 Processors

### KEY FEATURES AND BENEFITS

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Highest overall compute and memory performance of any standard ISA Embedded Processor</td>
<td>• 120GHz of total compute in a single chip</td>
</tr>
<tr>
<td>• Comprehensive Hardware Virtualization</td>
<td>• Scalable to higher throughputs using Marvell Coherent Processor Interconnect (CCPI)</td>
</tr>
<tr>
<td>- MIPS64 Release 5 compliant</td>
<td></td>
</tr>
<tr>
<td>- Native Kernel-based Virtual Machine (KVM) support</td>
<td></td>
</tr>
<tr>
<td>- PCIe SRIOV (Single root I/O Virtualization) support</td>
<td></td>
</tr>
<tr>
<td>• Integrated Neuron Search Engine – L2 to L4 lookup</td>
<td>• DDR4 and DDR3 with ECC support</td>
</tr>
<tr>
<td>• Latest, highest-bandwidth serial I/Os for Standard Connectivity: XLAUI/ XAU/ RXAUI/XFI, x8 Interlaken support, PCIe Gen 3</td>
<td>• 100 Gbps+ packet processing and security processing with seamless connectivity to peripherals</td>
</tr>
<tr>
<td>• LZS storage compression mode, compression/decompression performance up to 50Gbps</td>
<td>• Software compatible with all OCTEON families</td>
</tr>
<tr>
<td>• Integrated fourth-generation Deep Packet Inspection (DPI) and security acceleration 100 Gbps+ engines without additional memory requirements</td>
<td>• Accelerates LZS to address additional storage applications in addition to ZIP/PKZIP/GZIP support</td>
</tr>
<tr>
<td></td>
<td>• Deterministic pattern matching performance, independent of # of flows and rules, most compact graph size</td>
</tr>
<tr>
<td></td>
<td>• Linear performance scaling with full coprocessor services at line rate</td>
</tr>
<tr>
<td></td>
<td>• Ability to partition into multiple virtual SoCs</td>
</tr>
<tr>
<td></td>
<td>• Flexible power gating and dynamic power control to achieve best performance/Watt</td>
</tr>
</tbody>
</table>

---

**OCTEON® III CN78XX - Based System Block Diagrams**

---

**Services Blade Solution**

**Services Coprocessor Solution**
### TARGET APPLICATIONS

- High Performance Processing for Software Defined Networking (SDN) and Network Functions Virtualization (NFV)
- Borderless Enterprise
  - High-End Enterprise Switches + Routers
  - Wireless LAN Controllers
  - Unified Threat Management Appliances
  - WAN Optimization Appliances
- Secure Cloud Services
  - Application Delivery Switches
  - Secure Storage switches, FC to IP bridges
  - Load Balancers
  - Security Appliances and Blades
- Wireless Infrastructure
  - 3G/4G/LTE Gateways
  - ATCA Blades and AMCs
  - xGSNs, Evolved Packet Core (EPC, eNB, RNC)es

### SOFTWARE SUPPORT

- Industry’s most comprehensive software development kit (SDK) for embedded applications including
  - Commercial-grade Linux (Kernel 3.x)
  - Complete GNU tool-chain, GDB
  - Performance analysis and profiling tools
  - Optimized C libraries for security, DPI, de/ compression processing
- Complete production quality development toolkits for TCP/IP, IPsec, SSL, SSL-VPN and Deep Packet Inspection
- Comprehensive Ecosystem support
  - Popular third-party Operating systems and Toolchains
  - Broad range of third-party application software vendors
  - Appliances, AMC, ATCA cards from Marvell Ecosystem

## PRODUCT TABLE

<table>
<thead>
<tr>
<th>Device</th>
<th>Part Number</th>
<th>MIPS cores</th>
<th>Performance Max. (Billion) Available Instructions Per Second</th>
<th>Option</th>
<th>L2 Cache</th>
<th>Ethernet</th>
<th>PCIe</th>
<th>Interlaken</th>
<th>Coherency Interface (OCTEON Coherent Interconnect)</th>
<th>Memory IO w/Ecc</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN7890</td>
<td>CN7890-XXX-BG2601-Option Code</td>
<td>48</td>
<td>240B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CN7880</td>
<td>CN7880-XXX-BG2601-Option Code</td>
<td>32</td>
<td>160B</td>
<td>AAP, SCP</td>
<td>16MB</td>
<td>Up to 4x XLAUI, Up to 8x XAUI, Up to 16x KR/XFI</td>
<td>Up to 2 x8 PCIe Gen3</td>
<td>Interlaken</td>
<td>AAP Only</td>
<td>4 x72b DDR3 2133MHz DDR4 2400MHz</td>
<td>2601FCB-GA</td>
</tr>
<tr>
<td>CN7870</td>
<td>CN7870-XXX-BG2601-Option Code</td>
<td>24</td>
<td>120B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Device Options:**
Device Speed Grade (1600 = 1.6GHz, 1800 = 1.8 GHz, 2000 = 2 GHz, 2500 = 2.5 GHz)

**Option code for device family listed below:**
AAP = Application Acceleration Processor: Includes RAID, encryption, RegEx acceleration, compression/decompression, networking, TCP acceleration, QoS, and CCPI
SCP = Secure Communication Processor: Includes encryption, networking, TCP acceleration and QoS

### ABOUT MARVELL:
Marvell first revolutionized the digital storage industry by moving information at speeds never thought possible. Today, that same breakthrough innovation remains at the heart of the company’s storage, networking and connectivity solutions. With leading intellectual property and deep system-level knowledge, Marvell semiconductor solutions continue to transform the enterprise, cloud, automotive, industrial, and consumer markets. For more information, visit [www.marvell.com](http://www.marvell.com).

Copyright © 2019 Marvell. All rights reserved. Marvell, the Marvell logo and OCTEON III are registered trademarks or trademarks of Marvell and/or its affiliates in the US and/or elsewhere. Other names and brands may be claimed as the property of others.