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Marvell® OCTEON III® CN70XX and CN71XX Single to QuadCore Embedded Processors with Hardware Virtualization

Multi-Core MIPS64 Processors

Overview

The OCTEON III® CN70XX/CN71XX families of Multi-Core MIPS64 Processors target SMB and entry-level Enterprise platforms for networking and storage including Service Provider Gateways, Switches, Routers, Security Appliances, Network Attached Storage (NAS), Mainstream Control Plane, Network attached Printers, Enterprise WLAN Access Points, Industrial and Military/Aero. The families includes six software and pin-compatible processors, with one to four cnMIPS64 v3 cores on a highly-integrated SoC that includes a rich set of I/O's including PCIe Gen2, 9 GbE controllers, 10GbE, USB 3.0, and SATA 3.0 along with Marvell's most advanced fourth-generation application hardware acceleration.
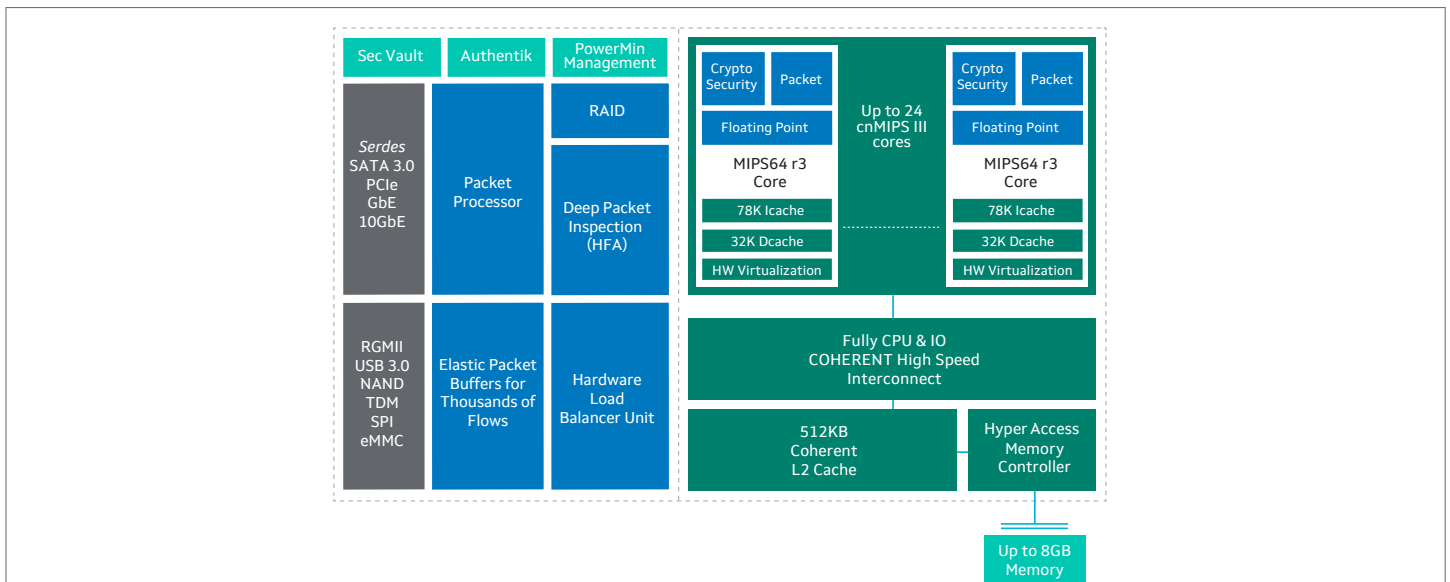
Block Diagram

OCTEON III® CN70XX/CN71XX Block Diagram
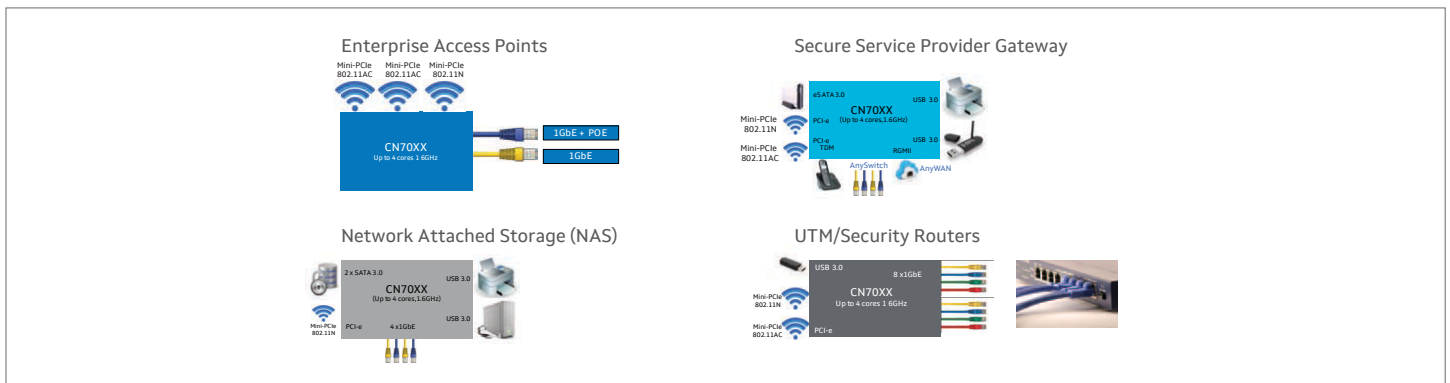
OCTEON III® CN70XX/CN71XX - Application Block Diagram

Key Features

Features	Benefits
Up to 4 cores at 1.6GHz per core with large 78K/32K L1 cache and shared 512KB L2 cache	· Low power - suitable for fanless and POE designs
Rich I/O interfaces including DDR3/4, Q/ SGMII, RXAUI, SATA3.0, USB 3.0, and PCIe Gen2	· Virtualization support enables legacy OS and applications to be firewalled
Integrated fourth-generation Deep Packet Inspection (DPI) and security acceleration engines without additional memory requirements	· >14M Packets Per Second of Networking Performance
Very low power down to <3W	· 23K Coremarks with gcc compiler (no special or custom compilers)
Integrated acceleration for networking, QoS, RAID, and multicore scaling	· >200MB/s of multi-flow NAS performance
Per Core Floating Point Unit and Hardware Virtualization	· Quad-core scalability for performance and feature headroom. Single platform for variety of applications and OEM SKU
36b DDR3/DDR4 up to 1333MHz	· Rich set of I/O minimizes BOM cost and enables most flexible system configuration options

Target Applications

- Enterprise 802.11ac/n/g access points
- Next-generation service provider gateways
- UTM and security appliances
- Network attached storage
- Control plane processors for blades/appliances
- SME Routers and switches
- Network Attached Printers
- Industrial Control
- Military/Aero Applications

Software Support

- Industry's most comprehensive software development kit for embedded applications including
  - Commercial-grade Linux
  - Complete GNU tool-chain, GDB
  - Performance analysis and profiling tools
  - Optimized C libraries for security and DPI
- Integrated Application Development Kits (ADK's) for AP, Gateway, and Router applications
- Production-grade software toolkits for TCP/IP, IPSec, SSL
- OpenWRT for Gateway and Router applications

Product Table

Part Number	cnMIPS cores	Max Frequency (MHz)	Networking I/F	Other System I/F	Memory I/O w/ECC
CN7010	1	800, 1000, 1200	Up to 2 x (QSGMII/SGMII) + 1x RGMII	Up to 3x PCIev2 + 2x USB 3.0 + 2x SATA 3.0	1x 36-bit DDR3/4 with ECC
CN7020	2	800, 1000, 1200			
CN7120	2	1000, 1200, 1500, 1600	Up to 2 x (QSGMII/SGMII) or 1 x RXAUI + 1x RGMII		
CN7125	3	800, 1000, 1200, 1500, 1600			
CN7130	4	800, 1000, 1200, 1500, 1600			

Marvell® OCTEON III® CN73XX and CN72XX: 4 to 16 cores Embedded Processors for Enterprise, Data Center and Real time Cloud Applications

Multi-Core MIPS64® Processors

Overview

The OCTEON III® CN73XX/CN72XX families of Multi-Core MIPS64 Processors target Integrated Routers, Security Appliances, Control Plane for Routers and Switches, SDN and Data Center Accelerators, Virtualized Storage, Virtualized Cable and Wireless Infrastructure markets. Marvell's new OCTEON III SOCs pack up to 35GHz of compute, 100Gbps of L3 processing and 120Gbps of connectivity in a low-power envelope and compact footprint to address these next generation requirements. With 22 10Gbps SerDes, it provides a broad range of connectivity options for 40GbE/10GbE/1GbE along with wide PCI-e v3 interfaces for connectivity to host, ASIC, HBA, Storage controllers and line-cards in a wide range of systems. Support for network and storage virtualization is provided via SRIOv, NVMe over fabric, and SoC HW virtualization capabilities. The powerful programmable packet parser handles both existing and emerging protocols such as NVGRE, MPLS, and VxLAN 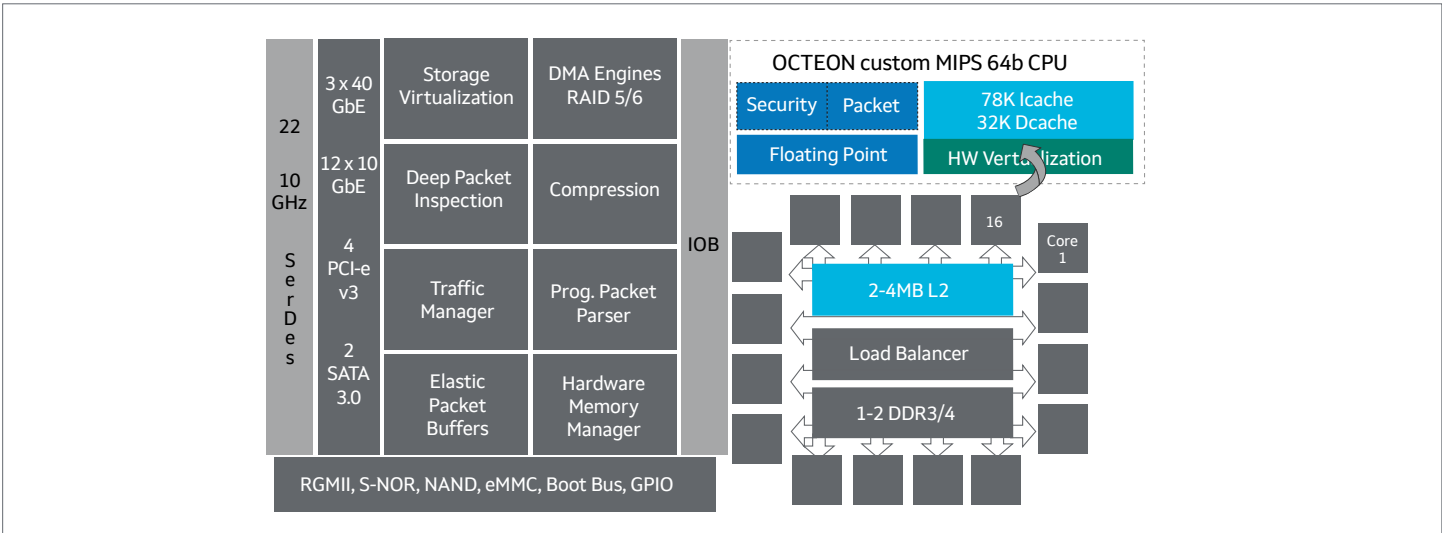at line rate while new traffic management capabilities provide the sophisticated traffic shaping and QOS required for application-centric networks. The security performance and capabilities are turbo charged with support for new crypto algorithms such as Elliptical Crypto (ECC), SHA2/SHA3, and high SSL transaction rates for large key sizes. This new family also features Deep Packet Inspection (DPI) and compression capabilities in a highly integrated System on a Chip.

The families includes several software and pin-compatible processors, with four to sixteen cnMIPS64 v3 cores on a highly integrated SoC that includes a rich set of I/O's including PCIe Gen3 with SRIOv and Storage Virtualization, 40GbE/10GbE/1GbE, USB 3.0, and SATA 3.0 along with Marvell's most advanced fourth-generation application hardware acceleration.
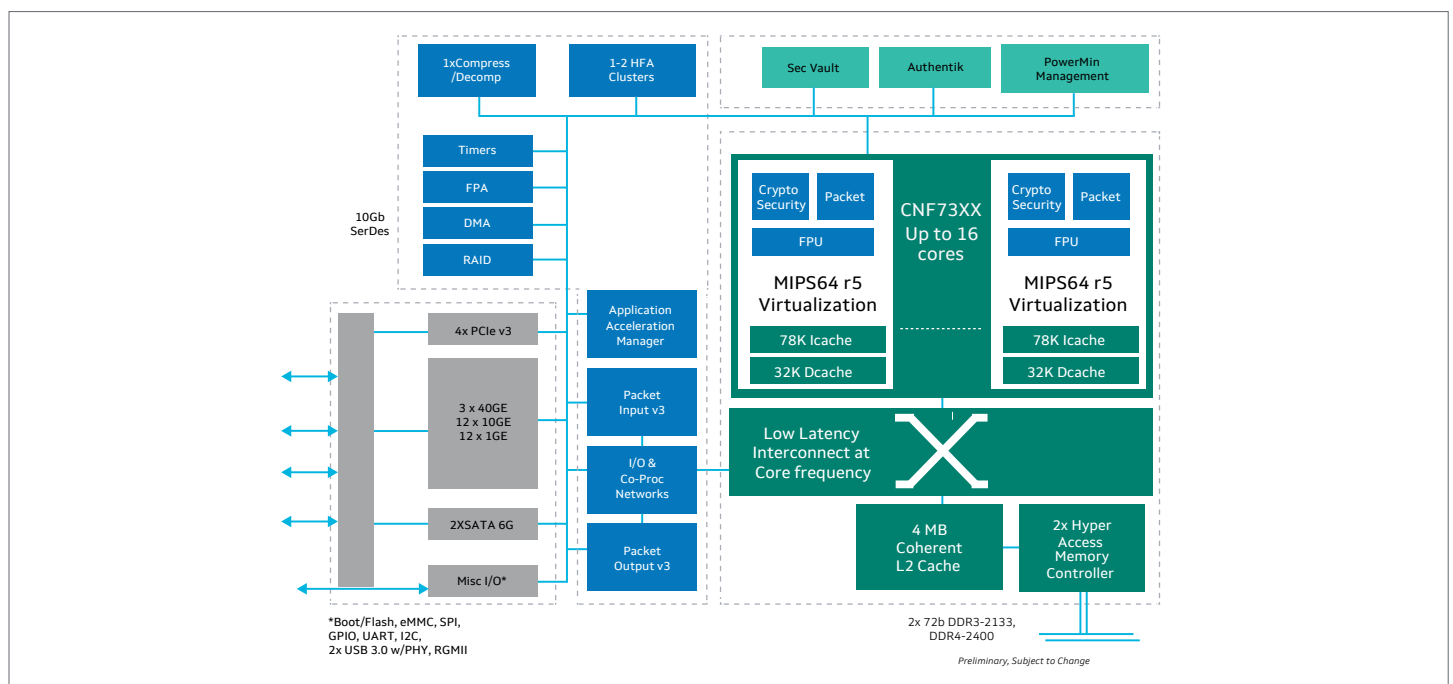
Block Diagram

OCTEON III® CN73XX - Block Diagram

OCTEON III® CN73XX - Based System Block Diagrams

Key Features

Features	Benefits
From four to 16 cores at up to 2.2GHz	· 35GHz of compute, 100Gbps of L3 processing in a low-power and compact foot print
Single (CN72XX) or Dual (CN73XX) 72-bit DDR3/4 controllers at up to 2400MT/s	· SOC Virtualization support for virtualized networked infrastructure
High networking and security performance, and connectivity – Up to 100Gbps of L3 processing – 40Gbps of Security, Application Visibility, and Control – 1G/10G/40GbE, PCIev3, SATA 3.0, USB 3.0	· Fits in PCI-e power spec and deliver multi-gigabits of performance for Data Center application
Extremely-low power consumption – Configurations as low as 8W – Meets stringent power requirements for PCIe offload adapter applications	· 130K Coremark with gcc compiler (no special or custom compilers)
Powerful Application Acceleration and Virtualization – Fully-flexible packet parser with rich traffic management – Unique network and storage virtualization features including SRIOv and NVMe	· Very High IOPS for Virtualized Storage over fabric
	· Programmable packet parser handles both existing and emerging protocols such as NVGRE, MPLS, and VxLAN
	· 40Gbps of security performance with support for new crypto algorithms such as ECC, SHA2/SHA3, Camellia, ZUC besides the bulk crypto of MD5, DES/3DES, AES, and high SSL transaction rates for large key sizes.
	· 4 to 16 cores in single foot print and SW compatible providing scalability for performance and feature headroom.

Target Applications

In-line packet processing

- Firewall (FW), Virtual Private Network (VPN), UTM Security Appliances
- Integrated Routers
- Storage Controllers, Appliances and Accelerators
- Data Center accelerators
- Control Plane for switches and routers
- Storage Security/Compression Appliances

Software Support

- Industry's most comprehensive software development kit for embedded applications including
  - Commercial-grade Linux
  - Complete GNU tool-chain, GDB, DDD
  - Performance analysis and profiling tools
  - Optimized C libraries for security and DPI
- Green Production-grade software toolkits for TCP/IP, IPSec, SSL, Deep Packet Inspection
- OpenWRT for Gateway and Router applications

Product Table					
Part Number	cnMIPS cores	Frequency Bins (MHz)	Networking I/F	Other System I/F	Memory I/O w/ ECC
CN7230	4	1200, 1500, 2000	12 x10GbE or 3 x40GbE	2 x8 or 4 x4 PCI-e v3 2 x SATA 3.0 2 x USB 3.0	1 x 64-bit DDR3/ DDR4 at max 2400 MTS
CN7240	8				
CN7340	8	1500, 1800, 2000			2 x 64-bit DDR3/ DDR4 at max 2400 MTS
CN7350	12				
CN7360	16				

# Marvell® OCTEON III® CN77XX Multi-Core MIPS64 Processors
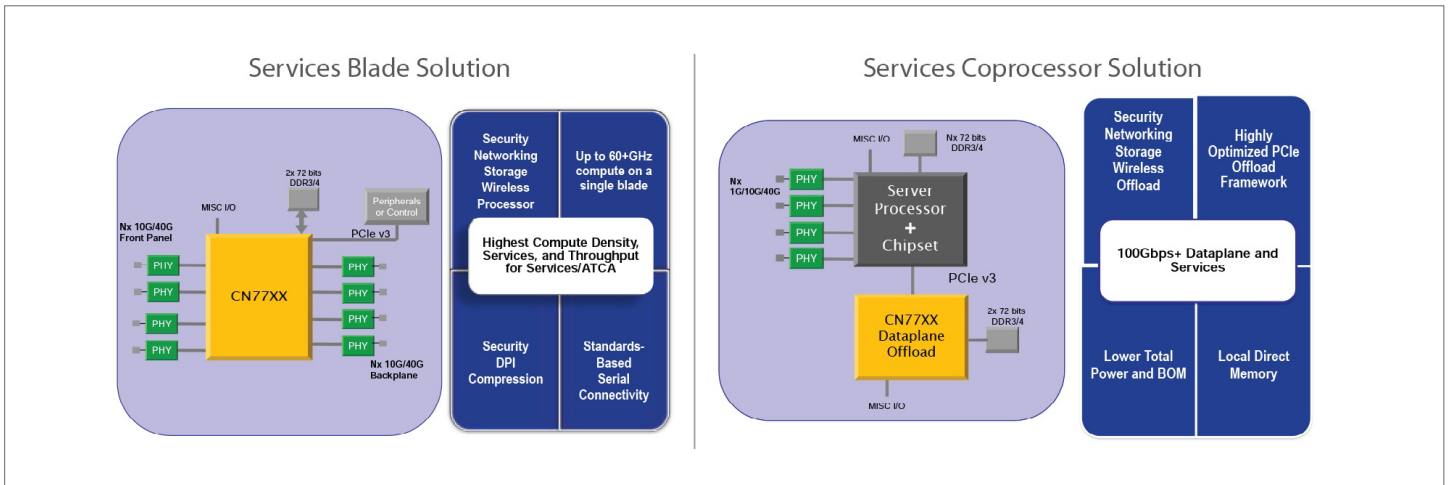
Multi-Core MIPS64® Processors

Overview

The OCTEON III® CN77XX 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. The family includes two software and pin-compatible processors, with 16 to 24 cnMIPS64 v3 cores running at up to 2.5GHz, rich hardware virtualization compliant with MIPS64 Release 5, multiple 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 at highest performance per watt. The CN77XX family provides extremely high-bandwidth connectivity based on the latest standards-based SerDes I/Os including XLAUI, PCIe Gen3, XAUI, Double-speed XAUI, XFI, RXAUI, and Interlaken.
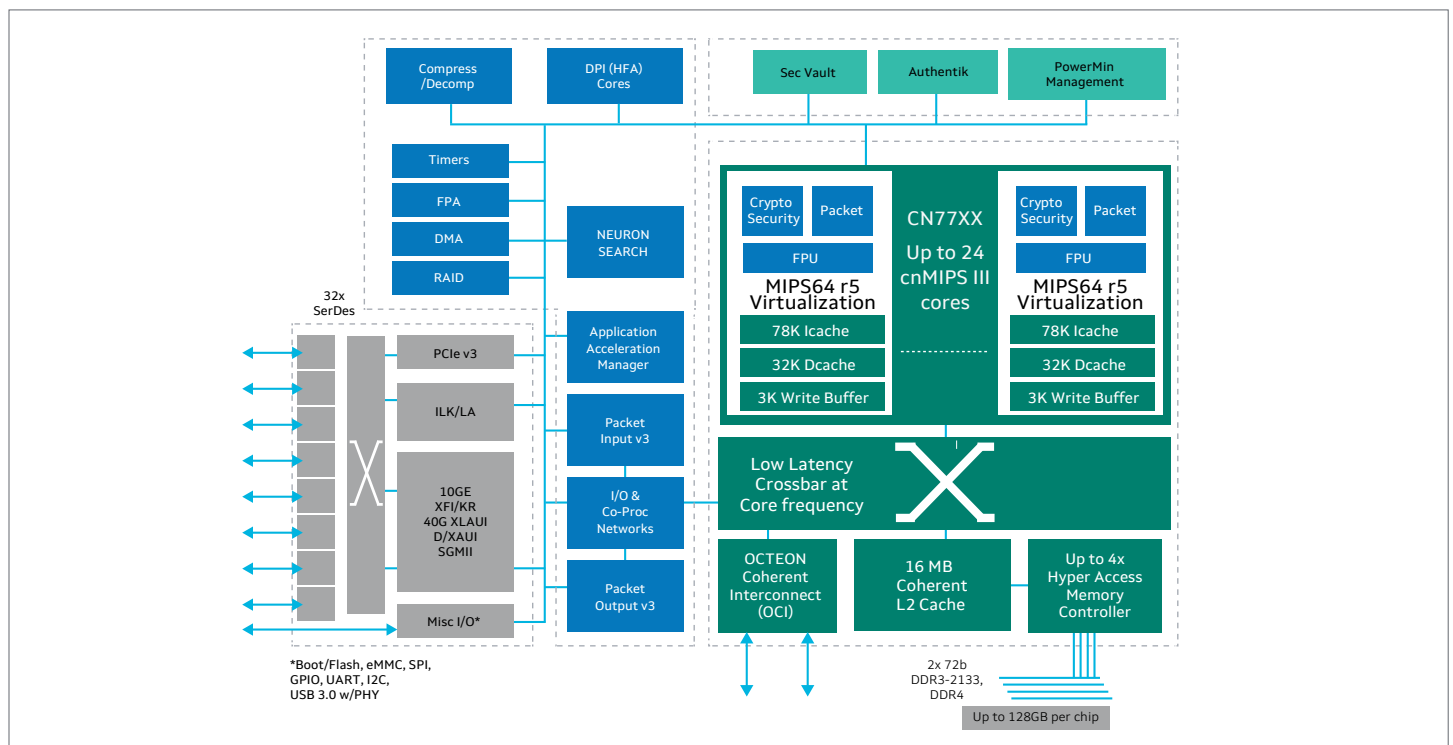
Block Diagram

OCTEON III® CN77XX - Block Diagram

OCTEON III® CN77XX - Based System Block Diagrams

Key Features

Features	Benefits
Highest overall compute and memory performance of any standard ISA Embedded Processor	· 60GHz+ of total compute in a single chip

Rich Hardware Virtualization
 	
  – MIPS64 Release 5 compliant
 	
  – Native Kernal Virtual Machine (KVM) support
 	
  – Ability to virtualize the 48 cnMIPS64 cores, Interfaces, and application accelerators
 	
  – PCIe SRIOV (Single root I/O Virtualization) support
	· DDR4 and DDR3 with ECC support

Integrated Neuron Search Engine – L2 to L4 lookup	· 100 Gbps+ packet processing and security processing with seamless connectivity to peripherals
Latest, highest-bandwidth serial I/Os for Standard Connectivity: XLAUI/ XAUI/ RXAUI/XFI, x8 Interlaken support, PCIe Gen 3	· Software compatible with all OCTEON families
LZS storage compression mode, compression/ decompression performance up to 50Gbps	· Accelerates LZS to address additional storage applications in addition to ZIP/PKZIP/ GZIP support
Integrated fourth-generation Deep Packet Inspection (DPI) and security acceleration 100 Gbps+ engines without additional memory requirements	· Deterministic pattern matching performance, independent of # of ows and rules, most compact graph size
High-bandwidth, low-latency I/O and coprocessor networks	· Linear performance scaling with full coprocessor services at line rate
Power Optimizer Technology with exible, dynamic control of device core power consumption	· Ability to partition into multiple virtual SoCs
	· Flexible power gating and dynamic power control to achieve best performance/Watt

Target Applications

- High Performance Processing for SoftwareDened Networking (SDN) and Network Functions Virtualization (NFV)
- Borderless Enterprise
  - High-End Enterprise Switches + Routers
  - Wireless LAN Controllers
  - Unied 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)

Software Support

- Industry's most comprehensive software development kit (SDK) for embedded applications including
  - Commercial-grade Linux
  - Complete GNU tool-chain, GDB
  - Performance analysis and proling 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's Ecosystem

Product Table

Device	Part Number	cnMIPS cores	Performance Max. (Billion) Available Instructions Per Second	Option	L2 Cache	Ethernet	PCIe	Interlaken	Coherency Interface (OCTEON Coherent Interconnect)	Memory IO w/ECC	Package
CN7770	CN7770-XXX BG2601-Option Code	24	120B	AAP, SCP	8MB	Up to 2x XLAUI Up to 6x XAUI /Dual XAUI Up to 8x KR/XFI Up to 24x SGMII	Up to 2 x8 PCIe Gen3	Up to 1 x8 Interlaken Up to 1 x8 Interlaken-LA	N	2 x72b DDR3 2133MHz DDR4 2400MHz	2601FCBGA
CN7760	CN7760-XXX BG2601-Option Code	16	80B								

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 OCI
SCP = Secure Communication Processor: Includes encryption, networking, TCP acceleration and QoS

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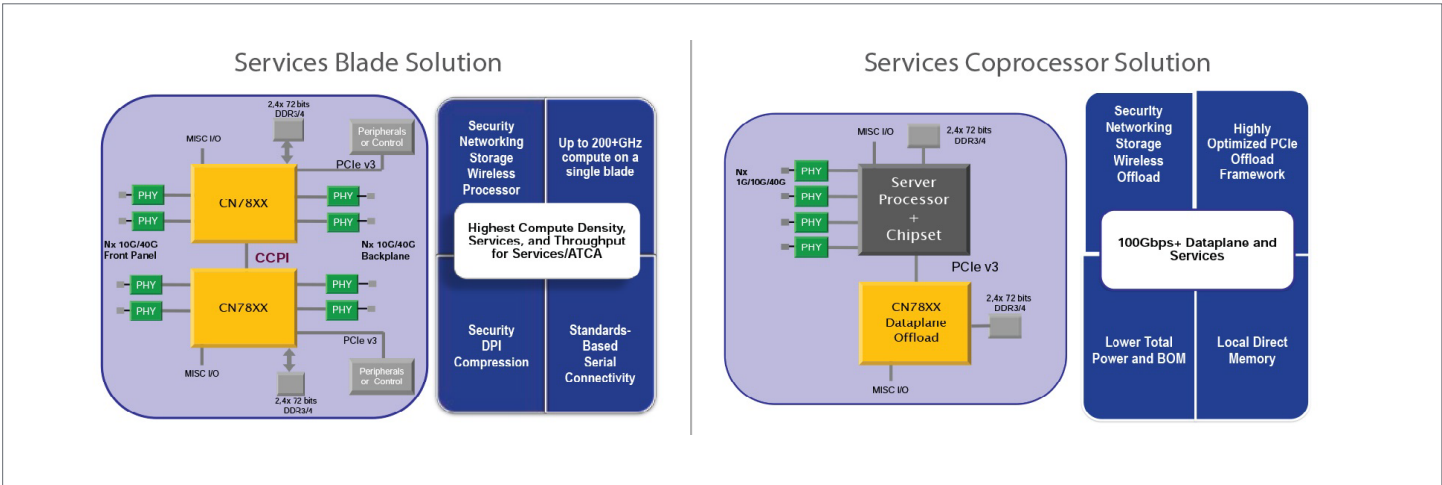
Multi-Core MIPS64® Processors

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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, XAUI, Double-speed XAUI, XFI, RXAUI, and Interlaken.
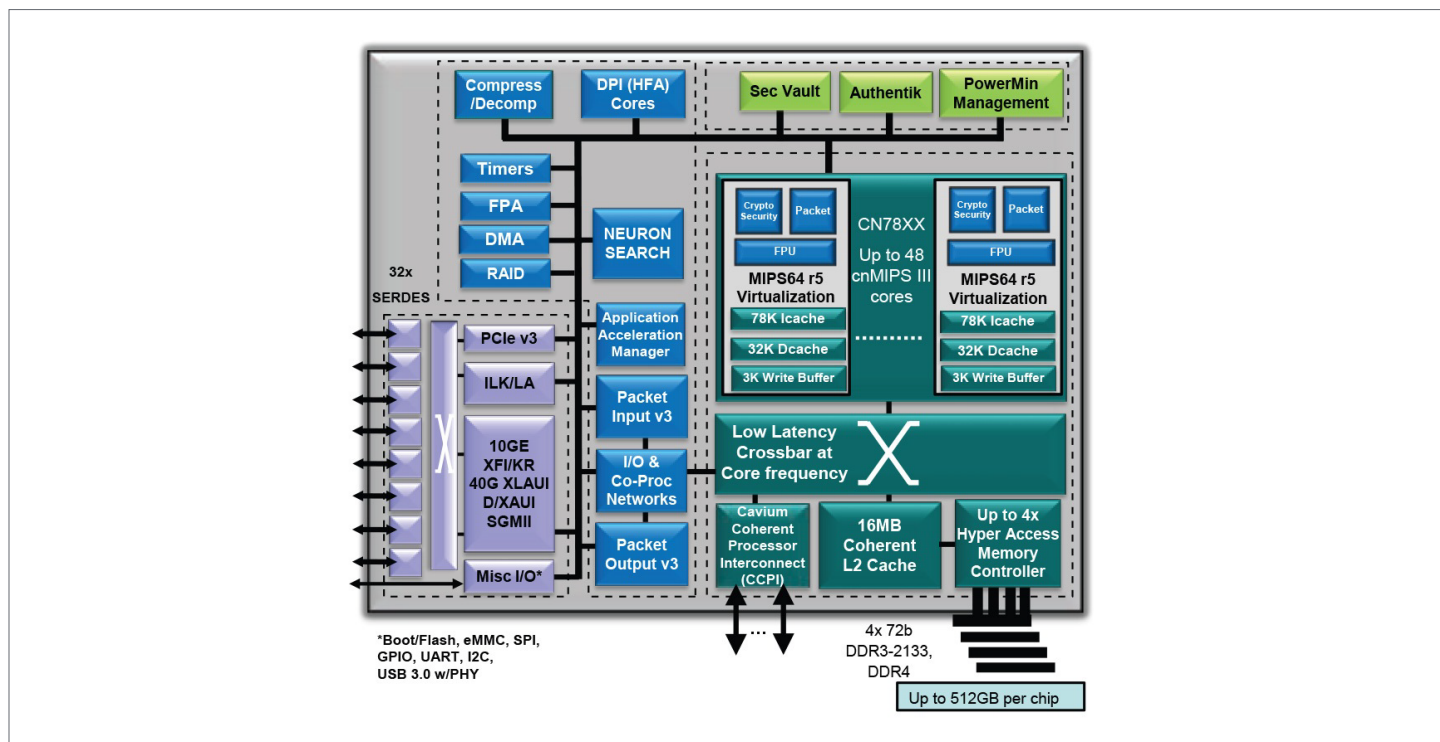
Block Diagram

OCTEON III® CN78XX - Block Diagram

OCTEON III® CN78XX - Based System Block Diagrams

Key Features

Features	Benefits
Highest overall compute and memory performance of any standard ISA Embedded Processor	· 120GHz of total compute in a single chip
Comprehensive Hardware Virtualization – MIPS64 Release 5 compliant – Native Kernel-based Virtual Machine (KVM) support – PCIe SRIOV (Single root I/O Virtualization) support	· Scalable to higher throughputs using Marvell Coherent Processor Interconnect (CCPI)
Integrated Neuron Search Engine – L2 to L4 lookup	· DDR4 and DDR3 with ECC support
Latest, highest-bandwidth serial I/Os for Standard Connectivity: XLAUI/ XAUI/RXAUI/XFI, x8 Interlaken support, PCIe Gen 3	· 100 Gbps+ packet processing and security processing with seamless connectivity to peripherals
LZS storage compression mode, compression/ decompression performance up to 50Gbps	· Software compatible with all OCTEON families
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	· Deterministic pattern matching performance, independent of # of ows and rules, most compact graph size
	· Linear performance scaling with full coprocessor services at line rate
	· Ability to partition into multiple virtual SoCs
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  - Performance analysis and profiling tools
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- Complete production quality development toolkits for TCP/IP, IPsec, SSL, SSL-VPN and Deep Packet Inspection
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CN7890	CN7890-XXXBG2601-Option Code	48	240B	AAP, SCP	16MB	Up to 4x XLAUI Up to 8x XAUI/ Dual XAUI Up to 16x KR/XFI Up to 32x SGMII	Up to 2 x8 PCIe Gen3	Up to 2 x8 Interlaken or 1 x12 Interlaken (100G) Up to 1 x8 of Interlaken-LA	AAP Only	4 x72b DDR3 2133MHz DDR4 2400MHz	2601FCBGA
CN7880	CN7880-XXXBG2601-Option Code	32	160B								
CN7870	CN7870-XXXBG2601-Option Code	24	120B								

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

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