

## Workload Optimized<sup>®</sup> ARMv8 Processors

### ThunderX<sup>™</sup> Family of Workload Optimized Processors



#### Product Brief

#### OVERVIEW

The ThunderX<sup>™</sup> product family is the best in class 64-bit ARMv8 Data Center & Cloud Processors, offering unprecedented level of integration and industry leading SoC performance. The product family comprises of high performance custom ARMv8 cores supporting single and dual socket configuration. The SoC integrates hardware accelerators, scalable Ethernet fabric, feature rich I/O's supporting full level of virtualization along with high memory capacity thereby providing the best in class performance/\$ and performance/watt. The ThunderX<sup>™</sup> family includes multiple Workload Optimized SKUs that enable servers & appliances that are optimized for compute, storage, networking and secure compute workloads in the cloud. This product family is based on highly efficient full custom processor cores designed by Cavium in 28nm process technology under architectural license from ARM. It is fully compliant with ARMv8 architecture as well as ARM's Server Base System Architecture (SBSA) standard.

#### FEATURES

##### Processor Sub-System:

- Scales from 24 to 48 cores with up to 2.5GHz frequency
- 78K-I-cache and 32K-D cache per core, 16 MB shared L2
- Single and Dual socket configuration support via CCPI<sup>™</sup>

##### Memory Interfaces:

- Up to 4 DDR3/4 memory controller
- Upto 1 TB of memory capacity in dual socket config

##### I/ O Interfaces:

- Multiple 10/40GE ports
- 100GE connectivity
- Multiple independent SATAv3 interfaces
- Multiple PCIe – x4 , x8

##### Virtualization:

- End-to-End virtualization from I/O to core (virtSoC<sup>™</sup>)

##### Accelerators:

- Integrated accelerators for virtualization, storage, networking and security

##### Operating System and Related Software Support:

- Server Base Boot Requirements (SBBR), UEFI, ACPI support
- SBSA Level 2 compliant
- Ubuntu V14.04 LTS and later
- Red Hat Early Access for ARMv8
- Fedora F20
- OpenSUSEV13

##### Management:

- External Baseband Management Controller (BMC)
- Supports standard BMC interfaces & functions
- IPMI 2.0 compliant

##### Reference Platforms:

- NephosX: 1U1S in ATX form factor (Single Socket)
- CumuluxX:2U4N, ½ SSI form factor(Dual Socket)

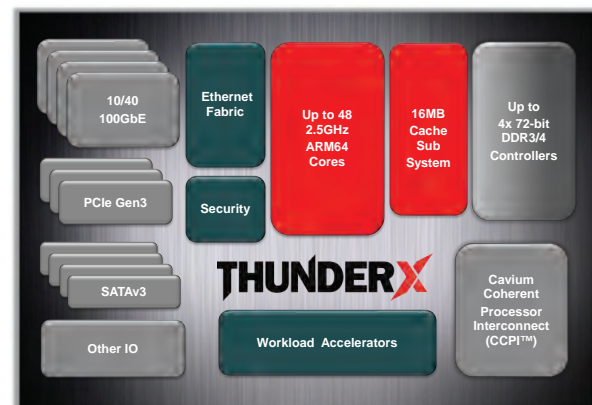
#### BENEFITS

Fifth Generation multi-core processor design from Cavium with proven building blocks and architecture.

Delivers workload optimized server class processing providing the best performance/watt and performance/\$.

##### Workloads:

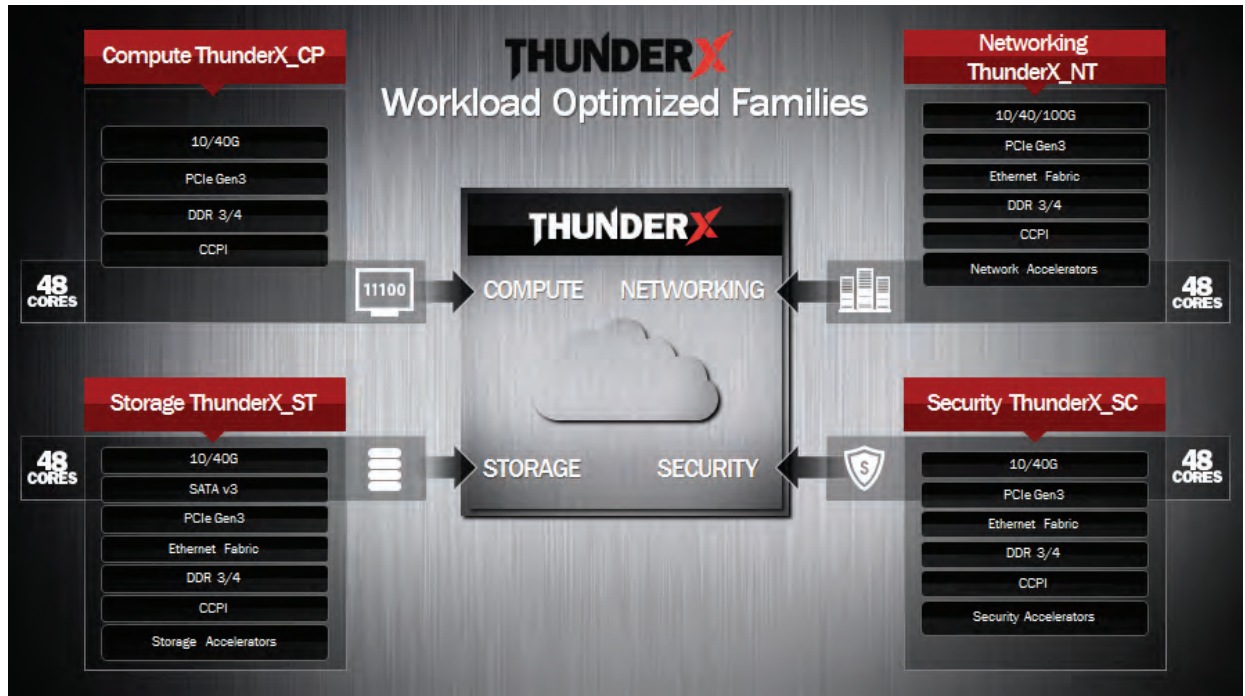
- Public & Private Cloud
- Web Caching, Web Search, Web Serving,
- Secure Web servers
- Distributed databases
- Data Analytics and Big Data
- Cloud Storage
- Telecom servers
- Network Function Virtualization (NFV) appliances



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**ThunderX\_CP<sup>™</sup>**: Up to 48 highly efficient cores along with integrated vSoC, multiple 10/40 GbE and high memory bandwidth. This family is optimized for private and public cloud web servers and content delivery, web caching and social media data analytics workloads.

**ThunderX\_ST<sup>™</sup>**: Up to 48 highly efficient cores along with integrated vSoC, multiple SATAv3 controllers, 10/40 GbE & PCIe Gen3 ports, high memory bandwidth, dual socket coherency, and scalable fabric for east-west as well as north-south traffic connectivity. This family includes hardware accelerators for data protection/ integrity/security, user to user efficient data movement (RoCE) and compressed storage. This family is optimized for Hadoop, block & object storage, distributed file storage and hot/warm/cold storage type workloads.

**ThunderX\_SC<sup>™</sup>**: Up to 48 highly efficient cores along with integrated vSoC, 10/40 GbE connectivity, multiple PCIe Gen3 ports, high memory bandwidth, dual socket coherency, and scalable fabric for east-west as well as north-south traffic connectivity. The hardware accelerators include Cavium's industry leading 4th generation NITROX and TurboDPI technology with acceleration for IPSec, SSL, Anti-virus, Anti-malware, firewall and DPI. This family is optimized for Secure Web frontend, security appliances and Cloud RAN type workloads.

**ThunderX\_NT<sup>™</sup>**: Up to 48 highly efficient cores along with integrated vSoC, 10/40/100 GbE connectivity, multiple PCIe Gen3 ports, high memory bandwidth, dual socket coherency, and scalable fabric with feature rich capabilities for bandwidth provisioning, QoS, traffic Shaping and tunnel termination. The hardware accelerators include high packet throughput processing, network virtualization and data monitoring. This family is optimized for media servers, scale-out embedded application and NFV type workloads.

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#### Product Brief

#### ThunderX\_CP – Compute

##### Workloads

- Public & Private Cloud
- Web Caching
- Web Serving
- Search
- Social Media Data Analysis

##### ThunderX\_CP

- High performance compute
  - 48 cores
- High network bandwidth & capacity
  - 10G/40G/100G
- High memory BW, Low memory latency
- Full end to end virtualization

#### ThunderX\_NT – Networking

##### Workloads

- Telecom Server
- Media Server
- NFV Appliance
- Gaming Server

##### ThunderX\_NT

- High network bandwidth
  - Multi-10G/40G ports
- Scalable compute performance
  - 48 cores
- High performance packet processing
  - Integrated Std Ethernet fabric
- virtSOC: Core to I/O virtualization
- High memory bandwidth / capacity
  - 4 DDR3/4 controller

#### ThunderX\_ST – Storage

##### Workloads

- Block, Object & Distributed File Storage
- Data Analytics
- Distributed Databases

##### ThunderX\_ST

- High network & storage I/O
- Highly scalable platform
  - Multi-SATAv3 ports
  - Multi-10G ports
  - Multi – x8 Gen3 PCIe
- Storage Accelerators
  - Data Protection/Compression
  - Big Data Search
  - RAID / CRC
- Integrated low latency fabric for NAS
- NVMe/SSD interface support

#### ThunderX\_SC – Security

##### Workloads

- Secure web front end
- Cloud RAN

##### ThunderX\_SC

- High network bandwidth
  - Multi- 10G/40G ports
- High compute performance
  - 48 cores
- Security Accelerators
  - SSL/ IPSEC/ DPI