

# Mango StorageBoost™ NVMe over TCP Target

Driving Force for Datacenter Acceleration



## EXECUTIVE SUMMARY

Mango StorageBoost™ – NVMe over TCP Target (NTT) is a revolutionary solution that enables high-performance disaggregated storage systems. Built on the standard TCP/IP protocol, NTT allows data centers to establish Ethernet-based infrastructures, significantly reducing total cost of ownership (TCO) while providing exceptional performance and scalability.

### High Performance

NTT delivers unmatched performance by offloading the entire I/O processing to dedicated hardware, reaching 90+% line-rate network speed. Powered by the TCP/IP Offload Engine (TOE), NTT accelerates the NVMe/TCP data path with zero CPU usage.

### High Flexibility

NTT delivers exceptional flexibility, offering a comprehensive range of customizable network and storage features. Administrators can easily configure storage servers tailored to the specific needs of their environment, ensuring optimal performance and efficiency.

### High Interoperability

NTT complies with established industry standards, ensuring effortless integration into existing datacenters. Additionally, its Ethernet-based solution paves the way for a highly cost-effective, vendor-agnostic infrastructure.

## HIGHLIGHTS

### HIGH PERFORMANCE NVME-OF TARGET SOLUTION

- Line-rate performance saturating the capacity of the network interface
- Zero CPU usage in the NVMe/TCP data path
- Direct communication with NVMe SSDs without CPU intervention

### CONFIGURABLE AND ADAPTABLE STORAGE SYSTEM

- Customizable NVMe & NVMe-oF capabilities (# of subsystems, # of connections, etc.)
- Configurable visibility of NVMe SSDs for exclusive or shared data accesses
- Flexible solution incorporating various storage features (reliability, security, etc.)

### INTEROPERABLE AND COMPATIBLE STORAGE SOLUTION

- Compatible with standard TCP/IP networks without requiring specialized hardware
- Compliant and interoperable with standard NVMe & NVMe-oF specifications
- Portable design across any FPGA platform

## SPECIFICATIONS†

### USE CASES

- Disaggregated All Flash Arrays
- Fabric-attached Bunch of Flash (FBOF)
- AI-ready Shared Storage System

### CAPABILITIES

- 2 NVMe subsystems
- 256 NVMe-oF connections
- 128 entries per NVMe-oF connection
- 32 NVMe SSDs
- 64 hosts sharing the NVMe SSDs
- 128KB MDTs (Maximum Data Transfer Size)
- Active-active/-passive multi-path

### NVME COMPATIBILITY

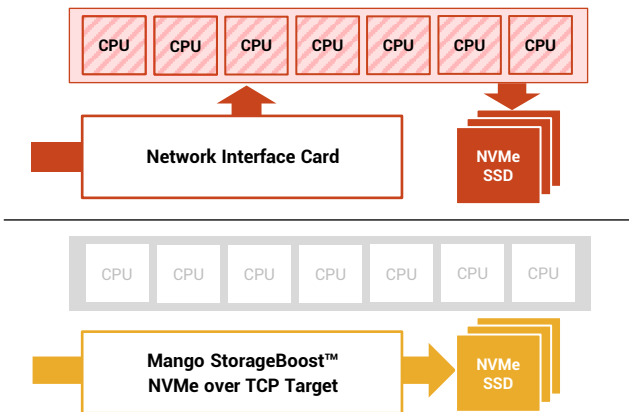
- NVMe 1.4/2.0 compatible
- NVMe-oF 1.1 compatible

### INTERFACE & PLATFORM SUPPORT

- PCIe Interface
  - > PCIe 3.0 x16 or PCIe 4.0 x8
- Ethernet Interface
  - > 2x 100GbE QSFP28
  - > Direct-attach copper or optical transceiver
- Hardware Platform
  - > Intel/Altera Agilex™ FPGAs
  - > AMD/Xilinx Alveo™ FPGAs

† The specifications above are part of the base configuration. Other configurations are available upon request.

## DESIGN OVERVIEW

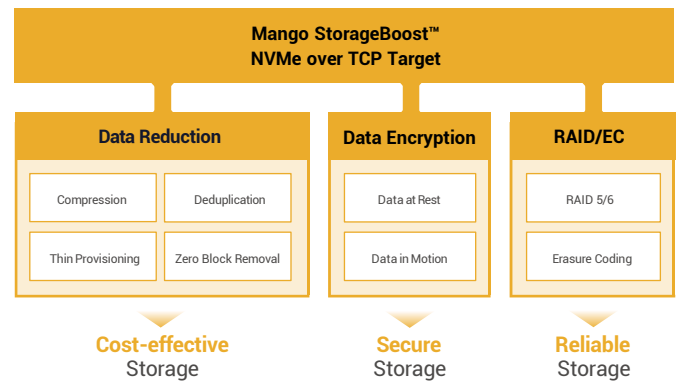


## Zero-CPU I/O Path

**Mango StorageBoost™ – NTT** is a zero-CPU solution that fully offloads the NVMe/TCP I/O stack. Built on MangoBoost's TCP/IP Offload Engine (TOE), the NVMe/TCP offload engine efficiently converts TCP payloads from the NVMe-oF protocol to the NVMe protocol, allowing communication with NVMe SSDs. This process is achieved through PCIe peer-to-peer communication, completely eliminating the need for CPU involvement. The significant reduction in CPU usage enables administrators to deploy lightweight storage servers, lowering total cost of ownership (TCO) without sacrificing performance.

## Flexible Storage Solution

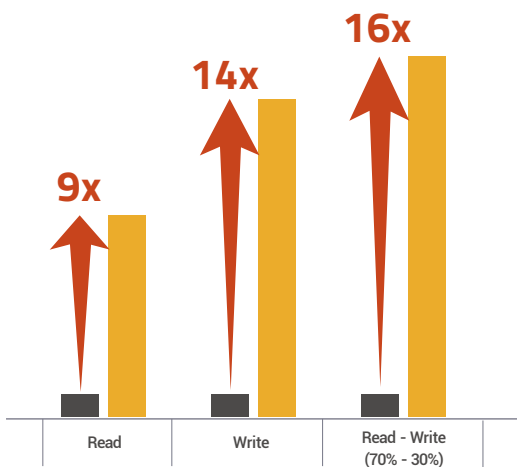
**Mango StorageBoost™ – NTT** is designed with a modular architecture, enabling the integration of various storage features to meet specific requirements. This allows storage servers to be tailored with feature combinations such as data reduction for cost efficiency, data encryption for securing sensitive information, and RAID or erasure coding for enhanced reliability and availability. The flexibility offered by NTT ensures that user-driven storage systems can easily adapt to the evolving demands of modern datacenters.



## EVALUATION RESULTS

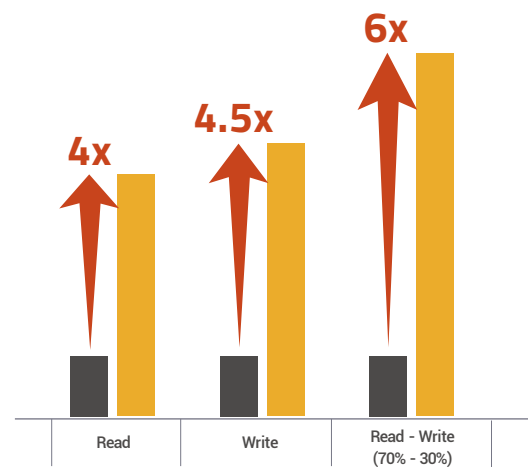
### Performance per Core

■ SPDK (24.05) ■ Mango StorageBoost™ NVMe over TCP Target



### Performance per Power†

■ SPDK (24.05) ■ Mango StorageBoost™ NVMe over TCP Target



† Only the power used by components directly involved in the actual data processing was considered. These include CPU, memory, NIC, and FPGA.

## DISCLAIMERS

The performance claims in this document are based on the internal cluster environment. Actual performance may vary depending on the server configuration. Software and workloads used in performance tests may have been optimized for performance only on MangoBoost products. Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. Results that are based on pre-production systems and components as well as results that have been estimated or simulated using MangoBoost reference platform for informational purposes only. Results may vary based on future changes to any systems, components, specifications, or configurations. Statements in this document that refer to future plans or expectations are forward-looking statements. These statements are based on current expectations and involve many risks and uncertainties that could cause actual results to differ materially from those expressed or implied in such statements. MangoBoost does not guarantee any specific outcome. Nothing contained herein is, or shall be relied upon as, a promise or representation or warranty as to future performance of MangoBoost or any MangoBoost product. The information contained herein shall not be deemed to expand in any way the scope or effect of any representations or warranties contained in the definitive agreement for MangoBoost products.

The information contained herein may not be reproduced in whole or in part without prior written consent of MangoBoost. The information presented in this document is for informational purposes only and may contain technical inaccuracies, omissions and typographical errors. The information contained herein is subject to change and may be rendered inaccurate for many reasons, including but not limited to product and roadmap changes, component and motherboard version changes, new model and/or product releases, product differences between differing manufacturers, software changes, BIOS flashes, firmware upgrades, or the like. MangoBoost assumes no obligation to update or otherwise correct or revise this information and MangoBoost reserves the right to make changes to the content hereof from time to time without any notice. Nothing contained herein is intended by MangoBoost, nor should it be relied upon, as a promise or a representation as to the future.

MANGOBOOST MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE CONTENTS HEREOF AND ASSUMES NO RESPONSIBILITY FOR ANY INACCURACIES, ERRORS OR OMISSIONS THAT MAY APPEAR IN THIS INFORMATION. © 2024 MangoBoost, Inc. All rights reserved.