



TCP Offload Engine

MangoBoost's *patent-pending* TCP Offload Engine (MB-TOE) offers scalable & configurable full TCP/IP stateful FPGA acceleration at 100Gbps to 1Tbps

Key Features

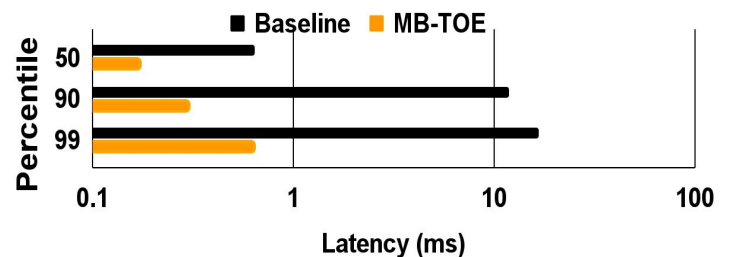
- Saturates 100 Gbps (even for small 128B transfers) and scales to 1 Tbps
- Supports 4K connections using 20Mb FPGA on-chip SRAM and 64K+ connections using DRAM or HBM
- User-space POSIX socket API for lightweight software integration
- Customizable congestion control (Cubic & New-Reno algorithms)
- Supports ARP and ICMP protocols
- Allows custom IP integration using standard AXI interfaces
- Written in C-based AMD Vivado HLS
- SystemC version available soon (on Siemens Catapult HLS) for portability to other FPGA/ASIC targets

Application Use Cases

- Web server (eg. Nginx)
- RPC acceleration
- AI inference server (eg. Triton)
- NVMe Over Fabrics using TCP

Case Study: Nginx Web Server

- Setup: MB-TOE on AMD U280 FPGA with 100Gbps network on Intel Xeon Gold 5118 2.3GHz host server
- MB-TOE runs at 250 MHz and uses 219K LUTs, 302K FFs, 539 BRAMs
- MB-TOE offers 2.8x better end-to-end system performance vs. no FPGA baseline for Nginx server
- MB-TOE reduces Nginx median & tail latencies drastically as shown in the figure below



Nginx tail latency improves by > 10x

Comparison to Other Solutions

	Host CPU	Accelerator CPU	ASIC	Existing FPGA	MB TOE
Host CPU Util.	High	Medium	Low	Low	Low
1 Tbps Throughput	No	No	Yes	No	Yes
Simult. Connections	64K+	64K+	64K+	1K	64K+
Flexibility	Limited	Limited	No	Limited	Yes