



TCP Offload Engine

MangoBoost's *patent-pending* TCP Offload Engine (MB-TOE) offers high-performance & flexible full TCP/IP stateful FPGA acceleration

Key Features

- Saturates 2x 100 Gbps line-rate (even for small 128B transfers)
- Supports 2x 2K connections using 40Mb FPGA on-chip SRAM and 64K+ connections using DRAM or HBM
- Provides user-space POSIX socket API for lightweight software integration
- Offers customizable congestion control (Tahoe & New-Reno algorithms, ECN)
- Supports ARP and ICMP protocols
- Allows custom IP integration using standard AXI interfaces
- Written in SystemC (Siemens Catapult HLS) for portability to other FPGA/ASIC targets

Application Use Cases

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

Case Study: Nginx Web Server

- Setup: MB-TOE on AMD U45N FPGA with 2x 100Gbps network on AMD EPYC 9534 2.45GHz host server
- MB-TOE runs at 250 MHz and uses 425K LUTs, 580K FFs, 1122 BRAMs
- MB-TOE offers 2x better end-to-end system performance vs. Linux baseline for Nginx server
- MB-TOE reduces Nginx median & tail latencies by 50%

Comparison to Other Solutions

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

