T7450-DPU

High Performance, Quad Port, Programmable 1/10/25/50GbE DPU

Enables ARM cores, several network and storage offloads, programmable compute, security, virtualization over a single wire.

Highlights

- Full suite of Storge features
- Full suite of Cloud features
- Full suite of data center networking features
- Full suite of data streaming features
- Full suite of encryption functions
- Embedded programmable DPU
- Embedded ARM A72 cores, accessible by user
- Adapter or micro-server functionality
- Integrated Ethernet and PCIe switch
- Software Compatible with T4, T5, and T6

Applications

Datacenter Networking

- Scale out servers and NAS systems
- Consolidate LAN, SAN, and cluster networks
- Enhanced network and server security

Cloud Computing

- Virtualization features to maximize cloud scaling and utilization
- Cloud-ready functional and management features
- Secure Sockets offload
- Full support for overlay products

Networked Storage

- Develop high-performance shared-storage systems providing both file and block level services
- Computational Storage
- Ethernet to the Drive
- Integrated encryption support
- NVMe Fabrics (iWARP and RoCEv2)
- NVMe/TCP (including NVMe offload)
- NVMe-NVMe bridge
- Very high data-integrity
- Dedupe and Compression support
- RAID and Erasure Coding support

High Performance Computing

- Very low latency Ethernet
- High performance RDMA support
- Increase cluster fabric bandwidth

Streaming Applications

- Internet attack protection
- QoS and Traffic Management
- Video streaming

Edge Products

- Micro Servers
- Gateways
- 5G Appliances
- Firewalls

Overview

Chelsio's T7450-DPU is a quad port 1/10/25/50GbE DPU with a PCI Express 5.0 host bus interface, optimized for storage, cloud computing, HPC, virtualization, security, and other datacenter networking applications.

The seventh generation T7 ASIC technology from Chelsio provides the highest performance and efficiency, with dramatically lower host-system CPU communications overhead thanks to on-board hardware that offloads TCP/IP, UDP/IP, Unified RDMA (RoCEv2 and iWARP), iSCSI, NVMe-oF, NVMe/TCP, NVGRE, VXLAN, and TLS/IPsec processing from its host system and reduces the host CPU cycles for the user applications. As a result, the system benefits from higher bandwidth, lower latency, and reduced power consumption.

T7450-DPU supports IEEE standards-based link aggregation, failover features, and inter-adapter failover techniques that make it ideal for critical network applications requiring redundancy and high-availability capabilities. It also includes an integrated Traffic Manager for robust and flexible flow control, traffic management, and QoS.

T7450-DPU runs the predecessor T4, T5, and T6 silicon software without modification to enable leveraging of the user's existing software investment. T7450-DPU's architecture is Chelsio's seventh generation DPU technology road-tested across several tier-1 OEMs over the years.

Integrated ARM system

T7450-DPU integrates 4 ARM A72 cores that are exposed to the user. The users can deploy and run their custom software or applications on these ARM cores, while offloading the traffic to the integrated 400Gb DPU. All the major functionalities available to the host CPU are available for ARM. To support the ARM Cores, Chelsio provides a full development and debug software package that allows development of the application specific firmware.

Programmable DPU Solution

The T7450-DPU transport engine is a programmable DPU that can offload protocol processing per-connection, per-server, per-interface, while simultaneously providing complete stateless offload to traffic for non-offloaded connections (processed either locally or by the operating system stack on the host CPU, if available). The T7450-DPU also provides a flexible direct data placement capability for regular TCP sockets, with all the benefits of zero-copy and kernel bypass without rewriting the applications.

Features

Host Interface
- PCI Express Gen5 x16
- End Point (EP) operation
- Root Complex (RC) operation*
- Concurrent RC+EP (NVMe-NVMe Bridge)*
- Integrated PCIe Gen4 Switch*
- MSI-X, MSI, legacy pin interrupts

Wire Interface
- NRZ or PAM4
- 4x1/10/25/50G SFP56
- IEEE 802.3cd (50/100/200GbE)
- IEEE 802.3by 25GbE
- IEEE 802.3az Energy Efficient Ethernet
- IEEE 802.3ap Backplane Ethernet
- IEEE 802.3ae (10 GbE)
- IEEE 802.3z (1GbE)
- IEEE 802.1p Priority
- IEEE 802.1Q VLAN Tagging
- IEEE 802.1Qbg EVB/VEPA
- IEEE 802.1BR Bridge Port Extension
- IEEE 802.1Qau Congestion Notification
- IEEE 802.1Qbb PFC
- IEEE 802.1Qaz (ETS)
- IEEE 802.3x Flow Control
- IEEE 802.3ad Load-balancing and Failover
- Ethernet II and 802.3 encapsulated frames
- Multiple MAC addresses per interface
- Jumbo Frames up to 9.6 Kbytes
- ITU-T G.8262, Sync-E
- IEEE 802.1AS Timing and Synchronization
- IEEE 1588 PTP

Stateless Offloads
- TCP/UDP checksum offload for IPv4, IPv6
- TSO, LSO, and GSO for IPv4 and IPv6
- VLAN filtering, insertion and extraction
- Packet filtering and attack protection
- Nanosecond granularity 64b timestamping
- Ethernet Routing (packet header rewrite)
- Packet Tracing and Packet Sniffing
- Adaptive interrupt coalescing
- Receive side scaling (RSS)

High Performance RDMA
- Native RoCEv2 support
- Native iWARP support
- All to All support

Storage Offloads
- iSCSI initiator and target mode stack
- T10 DIF/DIX support for iSCSI
- NVMe-oF Offload (iWARP)
- NVMe-oF Offload (RoCEv2)
- NVMe/TCP Offload
- QUIC Offload
- Dedupe offload
- Erasure Code offload
- RAID 5/6 offload
- Compression (LZ77+Huffman, Gzip, XP10, zlib)
- Decompression (LZ77+Huffman, Gzip, XP10, zlib)
- PMoF
- iSER Offload
- Data-at-rest encryption

Security
- AES 128/256 and SHA1/SHA2 offload
- TLS and IPsec co-processor mode
- TLS and IPSec inline mode
- QUIC co-processor mode
- QUIC inline mode
- SM2, RSA, ECC, ECDH, ECDSA, DSA, DH
- Inline IPsec and TLS for all Offload Traffic
- True Random Number Generator
- Secure firmware update
- Hardware Root of Trust support

Cloud and Virtualization
- NVMe Virtualization/Emulation
- Virt-IO
- OVS Offload
- Inband Telemetry
- NVGRE, VXLAN and GENEVE support
- PCI-SIG SR-IOV, 256 VF, 8 PF
- 264 port virtual switch
- EVB, VEPA, Flex10, and VNTag
- 512 MAC addresses
- NAT Offload

Streaming
- Integrated Traffic Management
- Advanced QoS support
- Hierarchical QoS

Boot Facilities
- iSCSI, PXE, UEFI
- Secure Boot

TCP and UDP Offload
- Full TCP stack including IPv4 and IPv6
- Extensive RFC compliance and fully featured
- VLAN support up to 4096 VLAN IDs
- Load balancing and failover capabilities
- UDP Sockets API
- Low user-to-user latency
- Multicast replication on ingress or egress
- Patented Seamless Failover
- Proxy Switching

Data Center Features
- Internet Attack Protection
- PFC, DCB, CEE
- Time stamping support
- Flow mirroring, sampling, and statistics
- GPUDirect

Embedded Processors
- 8 x ARM Cores processors
- 8 x RISC processors at 1.2GHz
- 1 x DFP processor at 400Gb

System Memory
- 8 GB DDR5 RDIMM
- 4 x 32-bit channels at 4800MT/s

Management and Other Interfaces
- USB 2.0 Host Mode
- USB 2.0 Target Mode
- UART
- NC-SI
- SPI Flash
- I2C, MDIO, GPIO, JTAG
- PLDM, MCTP (SMBus or PCIe), RBT
- M.2 / U.2 connectors for DAS
- SGMII for 1Gb BMC interconnect
- MCTP over PCIe VDM
- JTAG IEEE 1149.1 and IEEE 1149.6
- G.8273.2 Class C high-accuracy boundary clock
- SyncE

Physical and Environmental
- Fully RoHS Compliant
- Operating Temp: -40° C to 85° C or -40° F to 185° F
- Operating Humidity: 5 to 95%
- Airflow: 200 lf/m

Ordering Information

	Description	Power
T7450-DPU	All Offloads	25W

Physical Interface: 50GBASE-SR4/LR4
Connector: SFP56/SFP28/SFP+
Media: MMF, SMF, or Twinax