Chelsio Communications — Accelerate

High Performance, Quad Port 10 GbE Unified Wire Adapter

Enables TCP, UDP, ISCSI, iWARP, and FCoE Offload over Single Unified Wire with SR-IOV, EVB/VNTag, DCB

Highlights

- PCI Express Gen3 x8
- Ultra Low Latency
- Supports Up to 1M Connections
- Full TCP and UDP offload
- Full iSCSI, FCoE offload
- Full iWARP RDMA offload
- Full NAT offload
- EVB, Flex10, VNTag
- PCI-SIG SR-IOV
- Integrated media streaming offload
- HW based firewall in the cloud
- Traffic filtering & management
- Software Compatible with T4

Applications

Datacenter Networking
- Scale up servers and NAS systems
- Link servers in multiple facilities to synchronize data centers
- Consolidate LAN, SAN, and cluster networks

Cloud Computing
- Virtualization features to maximize cloud scaling and utilization
- Runs InfiniBand, Fibre Channel apps unmodified over Ethernet
- Cloud-ready functional and management features
- QoS and Traffic Management

Networked Storage
- Enable high performance NAS systems and Ethernet-based IP SANs
- Develop shared-storage systems providing both file and block level services

High Performance Computing
- Very low latency Ethernet
- Increase cluster fabric bandwidth
- Deploy Ethernet-only networking for cluster fabric, LAN and SAN

Overview

Chelsio's T540-CR is a quad port 10 Gigabit Ethernet Unified Wire adapter with a PCI Express 3.0 host bus interface, optimized for cloud computing, HPC virtualization, storage, and other data center applications. Since the Host Bus Interface is PCI Express 3.0, this card can support all 4 10G ports running at line-rate.
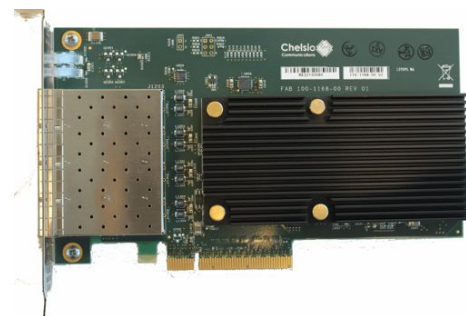
The fifth-generation (T5) technology from Chelsio provides the highest 10GbE performance in the industry and dramatically lowers host-system CPU communications overhead with on-board hardware that offloads TCP/IP, iSCSI, FCoE and iWARP RDMA processing from the host system and frees up host CPU cycles for other applications. As a result, the system benefits from higher bandwidth, lower latency, and reduced power consumption.

The Unified Wire Solution

The T540-CR enables a unified wire for LAN, SAN, and cluster traffic, made possible by the high bandwidth and low latency characteristics, combined with storage and cluster protocols operating over Ethernet (iSCSI, FCoE, and iWARP). T5 based adapters such as the T540-CR support both file and block based storage protocols and are ideal for building high performance SAN and NAS solutions. With both iSCSI and FCoE offload, FC applications can run natively over Ethernet, while taking advantage of its performance benefits and economies of scale. T5 also offers an ultra-low latency RDMA over Ethernet (iWARP) interface, making the T540-CR a competitive drop-in replacement for InfiniBand in high performance computing applications. It is supported in the same standard software distributions and allows running IB applications unmodified.

T540-CR integrates a full-fledged hardware Traffic Manager for robust flow control, traffic management, and predictable QoS.

The adapter's four ports and IEEE 802.3ad link aggregation, and port-to-port and adapter-to-adapter failover features are ideal for critical network applications that require redundancy and high-availability capabilities.

T540-CR Ethernet-only unified networking reduces the data center's cost in adapters, cables, switches, rack space, power, equipment spares, management tools, planning, installation and operation.

T5 - Fifth-Generation Protocol Offload Engine

The T5 is Chelsio's fifth-generation TCP offload (TOE), fourth-generation iSCSI, and third-generation iWARP (RDMA) design. T5 builds upon the T4 feature set and improves performance across the board. On the host bus side, the T5 exposes a PCI Express v3.0 x8 host bus interface, with up to 64 Gbps raw bandwidth to the server. T5 also provides support for PCIe I/O virtualization and integrated VM-to-VM switching.

Complete and Flexible TCP Offload

The T5 has hundreds of programmable registers for protocol configurations, RFCs, and offload control. The T540-CR can offload processing per connection, per-server, or per-interface, and simultaneously tunnel traffic from non-offloaded connections to the host processor for the native TCP/IP stack to process. The T540-CR provides a flexible zero-copy capability for regular TCP connections, requiring no changes to the applications, and delivers line rate performance at minimal CPU utilization and memory subsystem utilization.

Packet Switching and Routing

T540-CR integrates a high performance packet switch, which allows switching traffic from any of the input ports to any if the output ports (wire-to-wire) and from any of the output ports to any of the input ports (host-to-host), with header rewrite and NAT offload.

Robust, Proven Solution

Subjected to compatibility and stress testing over multiple years by several OEM test suites, and with production deployment in servers, storage systems, and cluster computing, Chelsio's robust, stable protocol offload technology delivers proven performance in a wide range of environments. The T540-CR is generations ahead of competing products in robustness and implementation maturity.

Software Drivers

Chelsio offers a full suite of protocol software drivers with the T540-CR adapters. See www.chelsio.com/support for the latest information. The software supports operation in both protocol-offload and non-offload modes.

Ordering Information

Model: T540-CR
Physical Interface: 10GBASE-SR or LR*
Connector: LC Duplex
Media: MMF or SMF

Accessories

SM10G-SR: 10G short-reach SFP+ optic module **TAPCABLE1M:** Twinax passive cable, 1M
SM10G-LR: 10G long-reach SFP+ optic module **TAPCABLE3M:** Twinax passive cable, 3M
SRCABLE3M: Fibre optic cable, 10GBASE-SR, 3M **TAPCABLE5M:** Twinax passive cable 5M
LRCABLE3M: Fibre optic cable, 10GBASE-LR, 3M

*SFP+ optics sold separately. Only Chelsio-supplied modules may be used.

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Specifications

Host Interface
- PCI-E Gen 3 x8
- MSI-X, MSI, and support for legacy pin interrupts

High Performance RDMA
- Low latency and line rate bandwidth
- Enhanced RDMA primitives
- iWARP support on Linux OFED
- Support for Atomics and Immediate Data
- Microsoft Network Direct support
- Supported Transport for SMB-Direct in Microsoft Windows Server 2012

UDP/IP & Multicast Offload
- UDP Sockets API offload
- Low user-to-user latency
- Multicast replication on ingress or egress

Virtualization
- PCI-SIG SR-IOV
- 128 Virtual and 8 Physical functions
- 144 port virtual switch
- EVB, VEPA, Flex10, VNTag
- 512 virtual MAC addresses
- Offload 802.1 Qbg/h
- NVGRE & VxLAN

TCP/IP Full Offload
- Full TCP implementation including IPv4 & IPv6
- Extensive RFC compliance, fully features stack
- Full TCP Proxy between any set of connections
- VLAN support up to 4096 VLAN IDs
- Load balancing and Fail-over capabilities

iSCSI
- Full iSCSI initiator and target mode stack
- CRC32 offload generation verification
- iSCSI proxy switching based on SCSI CDB
- Full HBA offload
- T10 DIF/DIX support

FCoE
- Full HBA FCoE (Initiator or Target)
- Open FCoE Offload (Initiator)
- CRC32 offload generation & verification
- Ingress & Egress ACL (Access Control List)
- T10 DIF/DIX support

Stateless Offloads
- TCP/UDP checksum offload for IPv4 & IPv6
- TSO, LSO, and GSO for IPv4 & IPv6
- VLAN filtering, insertion, & extraction
- Line rate packet filtering and attack protection
- Fine granularity time stamping (down to 2ns)
- Ethernet Routing (packet header rewrite)
- Packet Tracing and Packet Sniffing

Ethernet
- IEEE 802.3ae (10 GbE)
- IEEE 802.3az (Energy Efficient Ethernet)
- IEEE 802.3z (1GbE)
- IEEE 802.1p priority
- IEEE 8021Q VLAN tagging
- IEEE 802.1Qbg EVB/VEPA
- IEEE 802.Qhn VNTag
- IEEE 9-2/1Qg/h Congestion Notification
- IEEE 802.3x flow control
- IEEE 802.3ad load-balancing and failover
- Ether II and 802.e encapsulated frames
- Multiple MAC addresses per interface
- Jumbo Frames up to 9.6 Kbytes

Physical and Environmental
- Dimensions without bracket
  6.6 in. x 3.95 in. or 16.76 cm x 10.03 cm
- Operating Temp: 0 to 55º C to 32 to 131º F
- Operating Humidity: 5 to 95%
- Airflow: 200 lf/m
- Typical power consumption: 16 W