

## High Performance, Dual Port 1 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 x4
- 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
- Traffic filtering & management
- Software Compatible with T4
- IEEE 1588v2 Precision Time Protocol

### Applications

#### Datcenter 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 T502-BT is a dual port 1 Gigabit Ethernet Unified Wire adapter with PCI Express 3 host bus interface, optimized for storage, cloud computing, HPC, virtualization and other data center applications.

The fifth-generation T5 ASIC technology from Chelsio provides the highest performance available and dramatically lowers host-system CPU communications overhead with on-board hardware that offloads TCP/IP, iSCSI, FCoE and iWARP RDMA processing from its host system. The T502-BT uses the same T5 engine that powers the 10G and 40G adapter versions. It supports the same complete suite of offloaded protocols, traffic management and rich server adapter feature set.



### The Unified Wire Solution

The T5 ASIC enables a unified wire for LAN, SAN, and cluster traffic, built upon a combination of high bandwidth and low latency architecture along with a complete set of storage and cluster protocols operating over Ethernet (iSCSI, FCoE, and iWARP). The T502-BT adapter allows converging all networking needs on a single adapter family, complete from 1Gb to 40Gb speeds, greatly simplifying maintenance, management and deployment tasks.

FCoE and iSCSI support in the T502-BT benefits from high reliability features that include memory ECC, datapath CRC and T10-DIX in addition to the checksums and CRC available at different protocols layers. iSCSI and FCoE provide a transition path from legacy SANs to converged networks.

The adapter supports IEEE 802.3ad link aggregation/failover features, as well as patented inter-adapter failover techniques that make it ideal for critical network applications requiring redundancy and high-availability capabilities.

T502-BT also includes an integrated Traffic Manager for robust flow control, traffic management, and QoS.

T502-BT Ethernet-only networking reduces the data center's cost in network adapters, cables, switches, rack space, power, equipment spares, management tools, planning, networking skills and installation.

## Fifth-Generation Protocol Offload Engine

The T5 is Chelsio's fifth-generation TCP offload (TOE) design, fourth-generation iSCSI design, and third-generation iWARP (RDMA) implementation. With support for the 8 Gbps Gen 3 data rate, the T5 ASIC PCIe interface provides 64 Gbps of raw bandwidth to the server. T5 also provides support for PCIe SR-IOV virtualization with embedded virtual switch.

## Complete and Flexible TCP Offload

The T5 has hundreds of programmable registers for protocol configurations, RFCs, and offload control. The T502-BT can offload processing per connection, per-server, per-interface, and globally and simultaneously tunnel traffic from non-offloaded connections to the host processor for the native TCP/IP stack to process. The T502-BT provides a flexible zero-copy capability for regular TCP connections, requiring no changes to the sender.

## Packet Switching and Routing

T502-BT integrates a high performance packet switch, which allows switching traffic from any of the input ports to any of the output ports (wire-to-wire) and from any of the output ports to any of the input ports (host-to-host).

## Robust, Proven Solution

Subjected to thousands of hours of compatibility testing, over a decade of stress testing by several OEM test suites and 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.

## Software Drivers

Chelsio offers a full suite of protocol software drivers with the T502-BT adapters. See [www.chelsio.com/support](http://www.chelsio.com/support) for the latest information. The software supports operation in both protocol-offload and non-offload modes.

## Ordering Information

Model:	T502-BT
Physical Interface:	Dual port 1GBASE-T (RJ-45)
Connector:	Cat-5
Media:	Twisted pair

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## Specifications

### Host Interface

- PCI-e Gen 3 x4
- 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 & Multicast Offload

- UDP Sockets API
- 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 9M2/1Qg/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 2.71 in. or 16.76cm x 6.88cm
- RoHS Compliant.
- Operating Temp: 0 to 55° C to 32 to 131° F
- Operating Humidity: 5 to 95%
- Airflow: 200 lf/m
- Typical power consumption: 12 W