# Chelsio T5 Unified Wire Suite for OpenPOWER

## Accelerate Network & Storage Performance on POWER Architecture

## What is OpenPOWER?

OpenPOWER is an "open source" model for hardware and software solutions, which simplifies system design with an alternative architecture. It is an initiative to build a collaborative and open technological ecosystem/community and provide customers the flexibility of building custom servers to suit their business needs using the POWER systems architecture. OpenPOWER Foundation, of which Chelsio is a member, is an organization founded by IBM to promote the future development of IBM's P architecture.

This paper explains how Chelsio's Unified Wire Software offers excellent support for the POWER architecture. With full TCP/IP, iWARP RDMA & iSCSI Offload on OpenPOWER systems over a single unified wire, T5 provides increased performance, efficiency and scalabilty while concurrently minimizing server and storage overheads.

## T5 on POWER Systems

Starting with Unified Wire software v2.11.1.0 for Linux, Chelsio has added support for systems based on POWER architecture (P7 & P8). The Terminator 5 ASIC has been successfully tested on a Customer Reference system **GN70-BP010** from TYAN, which is based on POWER8 and follows the OpenPOWER foundation's design concept. The system was running RHEL7.1 Little Endian operating system. This Unified Wire software supports iSCSI, iWARP RDMA and TCP Offload products on POWER architecture, which are explained below:

### iSCSI

iSCSI, the Internet SCSI standard, is the leading Ethernet SAN protocol, with native initiator support integrated into all the major operating systems. Chelsio's Unified Wire Adapters offer iSCSI offload capability in protocol acceleration for both initiator and target operation. iSCSI protocol processing is implemented in hardware, thus freeing the CPU for other computing needs. iSCSI preserves existing equipment without requiring a fabric overhaul, additional acquisition and management costs, with a high performance option thanks to hardware offload. Chelsio will be delivering 100Gb implementation of iSCSI without an API change, thus enabling the customers to leverage any software investment with Open Power & T5.

### RDMA

The Remote DMA (RDMA) protocol allows efficient memory-to-memory communication between two systems. With RDMA, all network protocol processing, protection and security checking is handled, in hardware, by the RDMA adapter. Chelsio's T5 RDMA implementation is a high performance, third generation design, which benefits from experience with hundreds of thousands of chips deployed in the field, across multiple generations.

Chelsio's T5 iWARP RDMA is shipping at 40Gbps, and is part of a high performance Unified Wire over Ethernet alternative to InfiniBand, enabling simultaneous operation of RDMA, NIC, TOE and iSCSI. Unlike InfiniBand, users of iWARP RDMA can preserve their investments in network functions, such as security, load balancing and monitoring appliances, and infrastructure in general. Thanks to TCP/IP, iWARP RDMA can natively run over regular Ethernet switches and routers, as well as operate over metropolitan (MAN) and wide area (WAN, US coast-to-coast) distances.

### TCP Offload

TCP Offload Engine (TOE) is a technology employed on Chelsio's adapters to offload the processing of TCP/IP stack from the host machine onto the Network Interface Card (NIC). Chelsio's TOE is the first and currently only engine capable of full TCP/IP offload at 10/40Gbps. Chelsio Unified Wire adapters can flexibly offload TCP/IP processing per connection, per-server or per-interface, while selectively and simultaneously tunnel traffic from non-offloaded connections to the host processor for the native TCP/IP stack to process. TOE provides a powerful zero copy capability for regular TCP connections, requiring no changes to the sender or receiver applications, to deliver line rate performance at minimal CPU and memory utilization, interrupts and context switches. With an efficient data processing path, TOE excels at small I/O performance and frees up precious CPU cycles for use by the applications.

## Conclusion

This paper provided an overview of Chelsio's Unified Wire Hardware and Software solution, and how it integrates seamlessly with OpenPOWER architecture. Using a Chelsio adapter along with the Unified Wire Software package available as part of the Chelsio solution, users can create and maintain a true Converged Fabric cluster where all storage and networking traffic runs over a single 10/40Gb network, rather than having to build and maintain multiple networks, resulting in significant acquisition and operational savings.

## Related Links

**The Chelsio Terminator 5 ASIC**
**TCP Offload at 40Gbps**
**iSCSI at 40Gbps**
**iSCSI Heritage and Future**
**iWARP: Ready for Data Center and Cloud Applications**