

Industry's First 100G iSCSI Offload for Arm

Using Qualcomm Centriq 2400 Arm Platform & Chelsio T6 Adapter

Executive Summary

The demonstration shows Chelsio 100G iSCSI offload solution delivering 96 Gbps line-rate iSCSI performance for a cost-effective enterprise-class storage target solution built with volume, off-the-shelf hardware and software components.

Chelsio Unified Wire's leading-edge performance and efficiency for networking, storage, and security applications combined with the Qualcomm Centriq 2400, the world's first 10-nanometer server processor, offer a complete best-of-breed 64bit Arm-based infrastructure for cloud datacenters. The coupling of the Qualcomm Centriq 2400 processor based QDF2400 REP server with Chelsio's industry-leading Unified Wire adapter solution delivers compelling performance, power and total cost of ownership (TCO) advantages. This enables innovative topologies and networked computing models to address the most demanding cloud datacenter infrastructure needs.

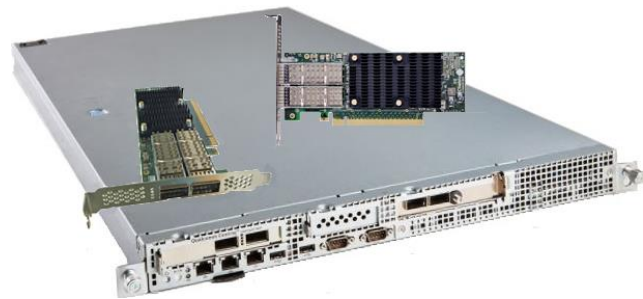


Figure 1 – QDF2400 REP Server and T6 adapters

Showcasing the iSCSI hardware offload capabilities of the Chelsio T6 Unified Wire adapters at 100Gb, the demonstration shows how storage array OEMs can easily enable such arrays with industry-leading iSCSI target performance. Fully compatible with the existing iSCSI ecosystem for both Target and Initiator functionalities and seamlessly leveraging routable and reliable TCP/IP as a foundation, Chelsio 10/25/40/50/100Gb iSCSI allows highly scalable and cost-effective storage solution using regular Ethernet infrastructure.

The Chelsio iSCSI Offload Solution

The Terminator 6 (T6) ASIC from Chelsio Communications, Inc. is a sixth generation, high performance 10/25/40/50/100Gbps unified wire engine which offers storage protocol offload capability for accelerating both block (iSCSI, FCoE) and file (SMB, NFS, Object) level storage traffic. Chelsio iSCSI Offload solution runs at 100Gb and beyond, and will scale consistently with Ethernet evolution. Chelsio's proven TCP Offload Engine (TOE), offloaded iSCSI over T6 enjoys a distinct performance advantage over regular NIC.

The Terminator 6 (T6) unified wire engine offers PDU iSCSI offload capability in protocol acceleration for both file and block-level storage (iSCSI) traffic. Furthermore, iSCSI support is part of a complete, fully virtualized unified wire offload suite that includes FCoE, RDMA over Ethernet, TCP and UDP sockets and user space I/O.

Chelsio iSCSI storage solution enables largest target & initiator ecosystem and most of the native initiator drivers are in-boxed in all major operating systems and hypervisors. This testing is based on Linux LIO iSCSI target driver. Chelsio supports iSCSI target drivers for both Linux and FreeBSD platforms.

Test Results

The following graph plots the READ, WRITE IOPS and Throughput of Chelsio T62100-CR adapter using Ramdisk as storage array. The results are collected using **fiio** tool with I/O size used varying from 512 to 512K bytes and an access pattern of random READs and WRITES.

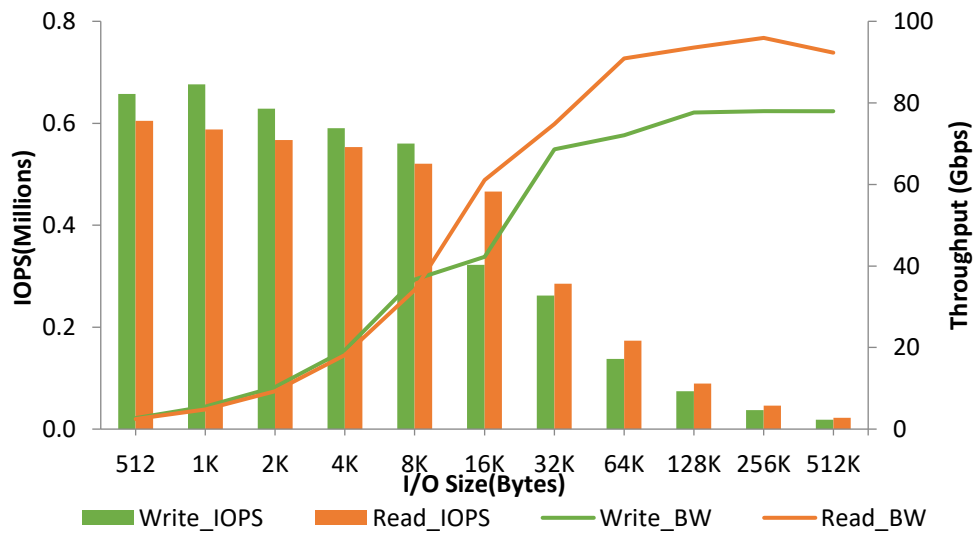


Figure 2 – READ, WRITE Throughput & IOPS vs. I/O size

T6 iSCSI solution delivers line-rate READ throughput of 96 Gbps. The WRITE throughput is limited by the performance of Arm setup. It also enables 675K IOPS (limited by number of initiators). Data is preliminary and further performance tuning is in progress.

The Demonstration

The iSCSI setup consists of a target storage array connected to an initiator using single 100G link. MTU of 9000B is used.

Topology

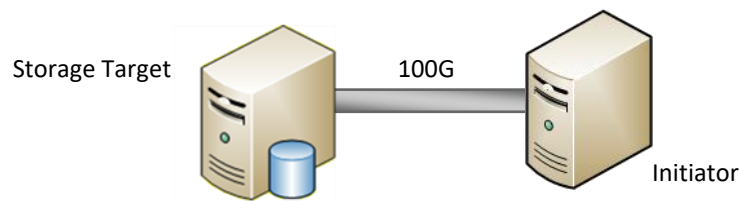


Figure 3 – Simple Back-to-Back Test Topology

- The **storage array** is a Qualcomm QDF2400 REP Server with 2 v1.1 24-core processors @ 2500MHz (HT disabled), 64GB RAM and RHEL 7.3 operating system (4.9.49 kernel). Chelsio's LIO Offload target driver is installed on the system with a T62100-CR adapter. The target is configured with 8 ramdisk LUNs, each of 600MB size.
- The **initiator machine** is setup with 1 Intel Xeon CPU E5-1660 v2 6-core processor @ 3.70GHz (HT enabled), 64GB RAM and RHEL 7.3 operating system (4.9.49 kernel). Chelsio's iSCSI PDU Offload initiator driver is installed on the system with a T62100-CR adapter. The initiator connects to 8 targets.

Command used

```
[root@host~]# fio --rw=randwrite/randread --ioengine=libaio --name=random --size=400m --invalidate=1 --direct=1 --runtime=30 --time_based --fsync_on_close=1 --group_reporting --filename=/dev/sdb:...:/dev/sdi --iodepth=$i --numjobs=$j --bs=<value>
```

Conclusion

This paper provided 100GbE iSCSI IOPS and Throughput performance results for Chelsio's 100GbE T62100-CR Unified Wire adapter in Qualcomm Arm based servers. The adapter performs consistently under load and delivers line-rate 96 Gbps READ throughput. Chelsio T6's iSCSI solution provides an all-round SAN solution for exceptional I/O performance and efficiency.

The entire solution, which includes Chelsio's iSCSI Offload software, the T6 adapter, and an off-the-shelf computer system including a high-end disk subsystem, provides industry leading performance with the highest IOPS and bandwidth available today. The resulting solution is highly competitive with special purpose systems and storage infrastructure currently on the market in both performance and cost.

Related Links

[The Chelsio Terminator 6 ASIC](#)

[High performance 100G iSCSI Storage Solution](#)

[High Performance iSCSI at 100GbE](#)

[Demartek Evaluation of the Chelsio T580-CR 40GbE iSCSI Offload Adapter](#)

[100G iSCSI – A Bright Future for Ethernet Storage](#)